DOCUMENT RESUME

ED 135 656

TITLE Investigating Your Environment: Teaching Materials

for Environmental Education.

INSTITUTION Forest Service (DOA), Washington, D.C.

PUB DATE

NOTE 109p.; For related document, see ED 103 209; Not

available in hard copy due to marginal legibility of

SE 022 148

original document

AVAILABLE FROM U.S.D.A. Forest Service, F.C. Box 2417, Room 3233,

Washington, D.C. 20013 (no price quoted)

EDRS PRICE MF-\$0.83 Flus Fostage. HC Not Available from EDRS. DESCRIPTORS

Community Involvement; Conservation Education:

*Environmental Education; Higher Education; *Instructional Materials; *Natural Resources;

*Sciences; *Secondary Education; Social Sciences;

*Teaching Guides

ABSTRACT

Included in this set of environmental education materials for secondary school students are six lesson plans. Each lesson plan has six components: (1) suggestions for setting the stage; (2) individual or group activities; (3) task cards; (4) charts and tables to be used for data interpretation; (5) suggested questions, discussions, and summaries; and (6) a statement of anticipated pehavioral outcomes. Lesson plans include the following topics: (1) scil investigation; (2) some water investigations; (3) some forest investigations; (4) investigating some animals and their environment; (5) a land use simulation; and (6) investigating a man-built community. (RH)

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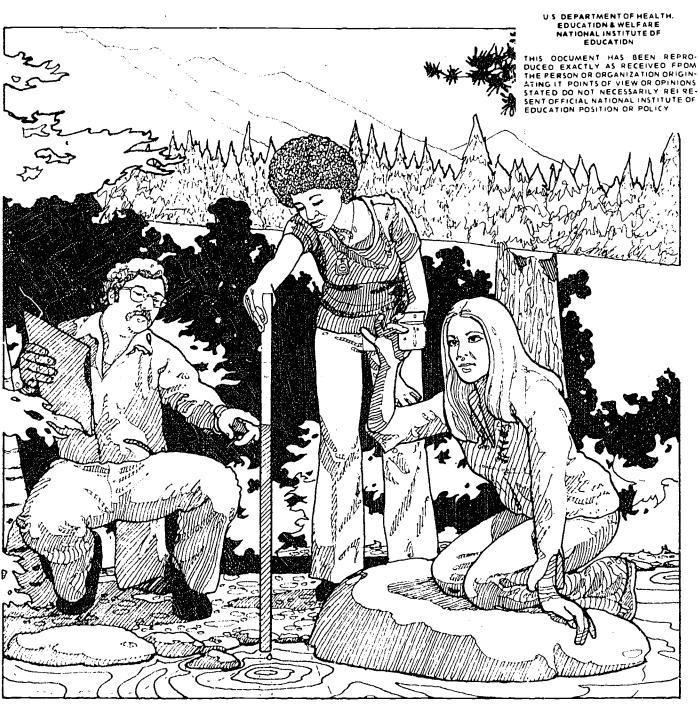
INVESTIGATING YOUR ENVIRONMENT

YOUR ENVIRONME
TEACHING MATERIALS FOR **ENVIRONMENTAL EDUCATION**

FOREST SERVICE

UNITED STATES DEPARTMENT OF **AGRICULTURE**

SEPTEMBER 1976



an introduction to

INVESTIGATING YOUR ENVIRONMENT SERIES

Making decisions about the management of our environment becomes a little easier if we understand what makes up that environment and how our actions affect it. The processes and techniques contained in these lesson plans enable people to examine directly different components of the environment and help them to understand the relationships among these components.

The investigations encourage participants to observe their surroundings and to collect, record, and interpret data. Facts and figures are collected as a means toward gaining a deeper understanding, not as an end in themselves. The questions and discussions are designed to elicit maximum response and involvement from the participants and to eliminate lecturing and show and tell activities. Each lesson plan provides a framework within which succeeding activities and discussions build on what has gone before, leading the participants to an understanding of environmental relationships. A knowledge of these relationships provides the basis for better comprehension of environmental problems and their possible solutions.

The various processes and techniques can be used to investigate many aspects of the environment. Some changes in specific activities, however, may be necessary when applying these lesson plans in different locations or situations.

Each lesson plan has six components:

- 1. Suggestions for setting the stage
- 2. Individual or group activities
- 3. Task cards for some activities
- 4. Charts and tables to be used in data interpretation
- 5. Suggested questions, discussions, and summaries
- 6. A statement of anticipated behavioral outcomes.

Discussion questions as shown in the lesson plans are designed to allow each person to contribute to the group's interpretation, understanding, and summarization of the subject being investigated. Many of the activity sequences will encourage additional questions and discussions.

The concluding discussion period is one of the most important parts of each investigation and is designed to:

- 1. Allow development of each participant's thoughts regarding the techniques experienced and their application.
- 2. Provide opportunities to discuss the implications of various management practices on a particular environment.

Implementing an Investigation

The lesson plans are self-explanatory, although there are some aspects of the overall process that need to be emphasized.

Preparation

- 1. Select the site and dry run the investigation on the site.
- 2. Plan and place the session so that each activity can be done well.
- 3. Use the lesson plan as a guide, especially for the questions and the discussion periods. Once the plan has become familiar, do not hesitate to revise it as necessary.

Investigating Your Environment Series Forest Service 1976







- 4. If there will not be enough time to do an entire investigation, decide in advance which activities should be omitted. Do not become trapped into moving so quickly that the participants are provided data rather than being allowed to collect it.
 - 5. Make sure that there is enough equipment and that it is in working order.

Beginning

- 1. Set the stage for what will happen during the session. Refer to the introductory paragraphs in each lesson.
- 2. Before leaving for the study area, have the participants discuss what effects the investigation itself may have on the environment and possible hazards that may be encountered.
- 3. Arrange for checking out and returning the equipment. Usually it is best to have one or more participants do this.

Implementation

- 1. Be sure to give clear directions. Do not be reluctant to read or write directions. Experience has shown that ad libbing instructions often changes and confuses the meaning.
 - 2. Listen to what the participants say and accept all their contributions.
 - 3. Refocus on the original question if the discussion digresses.
- 4. Allow adequate time for the final summary and discussion. It may take as much as one-half hour. This discussion is extrememly important because it concentrates on the application of what was learned during the investigation.
- 5. When appropriate, discuss how the investigation can be used in classrooms or on schoolgrounds, and especially how environmental studies can be integrated into various subject areas in the school curriculum.
 - 6. Consider using the summary discussion as an evaluation tool.

Conclusion

- 1. Constantly be alert for opportunities to expand, adapt, and improve subsequent investigations.
- 2. The ideas and activities presented in these teaching materials will come to life only as you try them, modify them, and improve them to fit your own needs, style, and situation.
 - 3. All of these materials are for public use and may be reproduced without prior permission.
- 4. The plans were developed with the assistance of educators, students, and resource-agency people. They have been successfully field-tested at environmental education workshops throughout the country.



a lesson plan for

A PROCESS AND PROBLEM-SOLVING APPROACH TO ENVIRONMENTAL EDUCATION

Set the stage for this session by reviewing quickly what will take place in the allotted time. For example, "In this session we will identify some techniques and processes for group problem-solving. We will then use these to solve a couple of problems and discussion their values."

SOLVING A PROBLEM THROUGH GROUP INTERACTION

Have audience arrange themselves in groups of six, or group chairs this way ahead of time. Pass out the "Bits of Information" problem, one bit of information to each person. (Use one of the problems of the end of this lesson plan.)

Tell the audience, "There is a problem to solve; you have all the information you need to solve the problem in your group. The only information you need from the facilitator is printed at the top of each list of information it says, "Although you may tell your group what is on this sheet, you may not pass it around for others to read."

Repeat instructions again to the whole group. If people tell you they don't understand, just repeat the instructions. After about 5 minutes into problem, pass out paper and marking pens. Write on board:

Trust Visual Display Matrix (chart)

Tell audience, "If the words on the board and the markers and easel paper passed out to you can help your group solve the problem, please use them."

As groups finish the problem, they may ask you for the right answer. Refer to the bit of information card held by one member of their group that tells them there is only one right answer and they can prove it. Ask them to verify their answer with another group. The purpose is not for the facilitator to tell a group that they are right or wrong, but for groups to develop trust in their own ability to solve problems and verify their findings.

Questions and Discussion

- 1. After all groups have finished the problem (20-30 minutes maximum), ask the following questions:
 - a. "What kept you from solving the problem to begin with?"
 - b. "What helped you to solve the problem later?"
- "The people who developed this exercise felt that it contains elements of involvement that most groups go through to solve common problems. They hypothesized that the following things would take place during the problem-solving exercise."

Trust
Ritualistic listening
Real listening
-Vision
-Space
-Noise

Investigating Your Environment Series Forest Service 1976 EE-1







- a. Trust lit is difficult for problem-solving to occur if people do not trust or feel comfortable with other people. You must trust that the facilitator gave you a solvable problem and that others in your group are communicating the information they have.
- b. Ritualistic listening This is a kind of polite listening because the data or information offered has no relevance at that time. Many speeches, introductions, etc., are often listened to ritualistically.
- c. Real listening When real problem-solving begins to take place, the kind of listening going on is very real because the information shared begins to mean something. People interrupt to say, "Please repeat that."

When real listening occurs, three things will change:

Vision - Participants will begin real listening by really looking at other people and constructing a visual display (writing data in a common place).

Space - Space factors will change:

People will usually move closer together.

People will sometimes change places or move around the table.

Noise - The noise level will go up when groups start working together.

- 3. "Using this type of activity at the beginning of a session can be important for several reasons."
 - a. It can be used as an icebreaker with a new audience.
 - b. The problem could not be solved without the contributions of each person in the group.
 - c. People feel more committed to a session if they contribute by saying something, the earlier the better.
 - d. It's easier to talk to each other in a small group than to talk to one instructor in front of a large group.
 - e. This exercise illustrates that each person in a group brings information and skills that can be used by the entire group to solve common problems. The pieces of paper represented the information and skills that each of you brought to the group.
- 4. 'We will be concerned in this activity with providing ways for each person to contribute knowledge, information, and skills to the solving of common problems. The content and activity itself are not always the most important—what is important is the idea that you can use different techniques to get people talking to each other and contributing as a group."
- 5. "None of us is as smart as all of us." Put up a chart with this printed on it or write this on the board.

OBSERVING AND CLASSIFYING TREE LEAVES

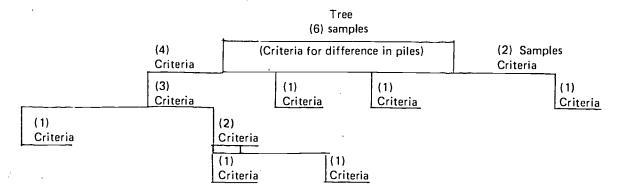
Questions and Discussion

- 1. "Let's transfer some of the problem-solving factors to another activity." Distribute six different tree specimens, a different one to each person in a group.
- 2. "Take your own leaf specimen and look at its observable characteristics. Since we are looking at observable characteristics, we won't be concerned with the name of the specimen.
- 3. After a minute, have each person share the observable characteristics of his or her other sample with other members of the group (about 4 minutes).
- 4. "Now each group put all the leaf specimens into two piles, on the basis of the major likenesses and differences of their leaf characteristics. Write down one criteria or reason you used to do it."



EE-2

- 5. Ask each group to tell the criteria or reason used. List them on the board.
- 6. "Your next task is for each group to construct a classification key. Construct the key using your own criteria as a starting point for putting the samples into two piles. Divide each pile into two more piles of samples based on the major likenesses and differences of their leaf characteristics. Continue dividing piles until you have only one specimen left in each pile. This is one way to make a key—you may want to use another way." Give each group a piece of paper and marker. Tell each Group to construct its key so everyone can see it. As you explain point 6, draw the key on the board, e.g.:



III. COMMUNICATING ABOUT THE TREE SPECIMENS

"Now that your group has finished, select one sample, and using the words in the key that describe that sample, write a description of it in sentence form." Print this instruction on the board.

Questions and Discussion

- 1. (After most of the groups have finished writing the sentence) "One person from each group read your group's description, and the other groups hold up the sample they think is being described. The other members of the group whose description is read should check to see if the other groups selected the right sample." You may have to ask people to hurry so as not to drag out this part. It is important, however, for each group to read its description.
- 2. (After all descriptions have been read) "How could we use this classification activity to improve communications among people?" (Form committee, common vocabulary, etc.)
- 3. "What else can we do with this key?" Sample responses:
 - a. Demonstration of ability to use the key by adding a new tree sample. Have sample to pass out to each group to see if it fits into the key.
 - b. Description on the difference between the key you make and another one. "Change keys with the group next to you. See if you can match up the samples and then compare the two keys."
 - c. Taking the key outside to use it in finding the trees or adding new ones. This can be security for teacher and student— the student builds a tool and develops a skill in the classroom and gets to use that tool and develops a skill in the classroom and gets to use that tool and skill in the outdoor classroom. The teacher doesn't need to know the names of trees to provide a meaningful learning experience for the student."
- 4. "Do you know more about the specimens now than when we started? We haven't even talked about names of these trees yet. Names may not be important to begin with. This classification process allows us to become familiar with the observable characteristics of the specimens. Now we are ready to use other written or picture keys to associate our descriptions with others and to find a name that society has given the tree." Use books



with picture keys, such as *Trees to Know in Oregon and Washington* and *Important Trees of Eastern Forests*, which usually are available at the local Forest Service, State Forester's Office, or local book stores.

IV. DESCRIBING CURRICULUM RELATIONSHIPS WITH THREE PARTS.

(Optional, depending on needs of group)

Questions and Discussion

- 1. "What other parts of trees can we use to classify?" List as column 1 on the blackboard or easel paper.
- 2. 'What curriculum areas can we use these parts of trees?" List as column 2.
- 3. 'What are some examples of How it could be used?' List as column 3.

	(1)	(2)	(3)
	PART OF TREE	CURRICULAR AREA USED (Art, Math, S.S.; Sc., etc.)	HOW USED
. (e.g.)	Bark	Art	Construct mosaic
	Shape		Classify different
	Leaves		textures, compare
	Branches		texture, patterns
	Wood		and designs of
	Cones		different kinds of
	etc.		bark

- 3. "Many people feel that classifying is strictly a science process, and can't or shouldn't be used in other subjects. We have just disproved that theory by showing that we can classify different parts of trees and use them in many parts of the curriculum."
- 4. "What other things in the environment can we classify (for example shoes, people, rocks, communities, and animals)?"
- 5. (Optional, depending on time constraints; 10 minutes) Have each group select a group of objects in the immediate environment and develop a classification key about them. Share results.

V. DESCRIBING VALUES AND PROCESSES

Pass out this lesson plan and have groups do Task A (about 10 minutes).

TASK A (pairs of small groups)

- 1. Describe the values of classifying things in the environment.
- 2. Give an example of the use of classification as a tool in environmental management.

Questions and Discussion

- "What are some values you've listed or talked about?" Sample responses might include: Because of group
 interaction you often look at things in a different way; it simplifies our information gathering and facilitates
 retention of knowledge; it is useful for previous history or future predictions; we each looked at it from our
 own frame of reference.
- 2. 'What are some examples of the use of classification as a tool in environmental management?"



EE-4

3. Have groups turn to Task B and discuss in groups which of the processes listed below were used so far in the session (about 10 minutes).

TASK B (Small groups) Mark the processes used in this activity and give an example of how they were used. **PROCESS EXAMPLE OF HOW USED** OBSERVING: Learner uses several of the senses (tasting, feeling, seeing, hearing, smelling, etc.) to collect data about environment. MEASURING: Using standard units of measure and "invented" units to determine quantity, quality, and extent. CLASSIFYING: After determining similarities and differences, learner places objects, ideas into groups or categories. INFERRING: On the basis of collected data and observations, learner can determine some possible reasons for observation. PREDICTING: On the basis of current data and experience, learner foretells future events, conditions, etc. COMMUNICATING: Learner can present information and ideas to others in verbal and nonverbal forms. FORMULATING HYPOTHESES: On the basis of preliminary experience and inferences, the learner establishes the direction for further inquiries. EXPERIMENTING: Learner seeks to find answers to an unsolved problem through various methods of testing, data collection, and interpretation. INTERPRETING DATA: Collected data are organized and compared with previously varified data in order to determine meaning.

This list was adapted from materials developed by the American Association for the Advancement of Science for the Project AAAS Commission on Science Education.

VI. SUMMARY

- 1. "In what ways were the six bits and tree classification activities similar?"
- 2. 'What did we find out about problem-solving techniques in this session?"



EE-5

- 3. "How can we summarize our discussions and activities?"
- 4. "The things we've just done are typical of the processes that we will use here. Although we will be investigating one environment, the same type skills and processes are transferable to the investigation of any environment."
- 5. "These types of skills and techniques can assist us in setting up problem-solving experiences for people to learn more about their role in the management of their environment."
- 6. You may want the participants to evaluate the sessions by writing how they felt about the session.

VII. SOME OBJECTIVES

Behavioral Outcome in Knowledge

- 1. As a result of this session, each participant should be able to:
 - a. Identify at least six factors that take place within a group to make it work more effectively together.
 - b. Identify and describe nine processes and their use in environmental data.collecting and interpretation, and problem-solving.

- Behavioral Outcome in Feelings, Awareness, Values, and Action

- 2. As a result of this session, each participant should be able to:
 - a. Describe the values of classifying things in the environment.
 - b. Describe the values and give examples of the use of classification as a tool in environmental management.
 - c. Describe how this problem-solving process can help people work together better.

VIII. EQUIPMENT NEEDED

Blackboard and chalk, or easel, newsprint, and markers.

Enough Six Bits of Information problems cut up for the small groups:

Tree leaf samples in sets of six for the small groups.

Optional: Picture keys, such as Trees to Know in your Local Area.







"SIX BITS OF INFORMATION" PROBLEM

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You may tell your group what is on this slip, but you may not pass it around for others to read.

В.4

You may tell your group what is on this slip, but you may not pass it around for others to read.

منطق والهوائم

Information

All teachers taught at the same time and exchanged groups at the end of each period.

Each teacher liked a different group best. Each teacher taught the group he liked best during the fourth period.

Carl was the team leader for the intermediate unit.

Information

Dottie taught the Freewheelers during the second period.

The Jets had three more members than the Aces.

The Jets had Agnes for a teacher during their third period.

$B_1^{\ 2}$

You may tell your group what is on this slip, but you may not pass it around for others to read.

B₁⁵

You may tell your group what is on this slip, but you may not pass it around for others to read.

Information

The team leader taught the Buckaroos during the first period.

Working out a schedule was difficult because Carl and Dottie wanted Edward to work with them during the same period.

Edward and Frieda could never agree on which group was easiest to handle.

Information

Each teacher taught every group during one of the first four periods of the day.

During the first period Agnes taught the Aces.

Of all the groups, Bob liked best to work with the Aces.

B_1^3

You may tell your group what is on this slip, but you may not pass it around for others to read.

B, 6

You may tell your group what is on this slip, but you may not pass it around for others to read.

Information

Your group members have all the information needed to find the answer to the following question. Only one answer is correct. You can prove it.

IN WHAT SEQUENCE DID DOTTIE TEACH THE VARIOUS INSTRUCTIONAL GROUPS?

Some of the information your group has is irrelevant and will not help solve the problem.

Information

The Howell Elementary School Intermediate Unit had four teachers, two teachers aides, and four instructional groups of students.

Each instructional group had chosen its own name.



"SIX BITS OF INFORMATION" PROBLEM Printed by permission of Michael Giammatteo, Ph.D.

D		1
D	?	

You may tell your group what is on this slip, but you may not pass it around for others to read.

B_2^2

You may tell your group what is on this slip, but you may not pass it around for others to read.

Information

The Dinosaurs had Tom for a teacher during the third period.

Dick and Belinda did not get along well and so they did not work together.

During the first period the Team Leader taught the group that Harry liked best.

Information

All teachers taught at the same time and exchanged groups at the end of each period.

Each teacher liked a different group best. During the second period each teacher taught the group he liked best.

Each teacher taught every group during one of the first four periods of the day.

B_2^3

You may tell your group what is on this slip, but you may not pass it around for others to read.

B_2^4

You may tell your group what is on this slip, but you may not pass it around for others to read.

Information

The Freznel Elementary School Intermediate Unit had two teacher's aides, four teachers, and four instructional groups of students.

Each instructional group had chosen its own name.

Sybil was the Team Leader for the Intermediate Unit.

Information

Your group members have all the information needed to find the answer to the following question. Only one answer is correct. You can prove it.

IN WHAT SEQUENCE DID THE APES HAVE THE VARIOUS TEACHERS DURING THE FIRST FOUR PERIODS?

Some of the information your group has is irrelevant and will not help solve the problem.

B2 5

You may tell your group what is on this slip, but you may not pass it around for others to read.

B_2^6

You may tell your group what is on this slip, but you may not pass it around for others to read.

Information

Belinda and Ralph disagreed about how it would be best to handle the Bombers who always had trouble settling down to work.

Dick preferred to work with the Champs over all other groups.

Although the Team Leader had been at Freznel School for five years, this was a shorter period of time than for the other team members.

Information

The Team Leader taught the Dinosaurs the second period.

Harry worked with the Bombers in the third period.

Sybil had been at Freznel School a shorter period of time than any of the other teachers in the Intermediate Unit.



EE-8

TASK B (Small groups)

Mark the processes used in this activity and give an example of how they were used.

PROCESS

EXAMPLE OF HOW USED

OBSERVING: Learner uses several of the sense (tasting, feeling, seeing, hearing, smelling, etc.) collect data about environment.	
MEASURING: Using standard units of measure and "invented" units to determine quantity, quality, and extent.	
CLASSIFYING: After determining similarities and differences, learner places objects, ideas into groups or categories.	
INFERRING: On the basis of collected data and observations, learner can determine some possible reasons for observation.	
PREDICTING: On the basis of current data and experience, learner foretells future events, conditions, etc.	
COMMUNICATING: Learner can present information and ideas to others in verbal and nonverbal forms.	
FORMULATING HYPOTHESES: On the basis of preliminary experience and inferences, the learner establishes the direction for further inquiries.	
EXPERIMENTING: Learner seeks to find answers to an unsolved problem through various methods of testing, data collection, and interpretation.	
INTERPRETING DATA: Collected data are organized and compared with previously varified data in order to determine meaning.	

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PROBLEM SOLVING APPROACH Task Card Lorest Service 1976



a lesson plan for

SOIL INVESTIGATION

Set the stage for this investigation by reviewing quickly what will take place in the allotted time. For example, say: "In this session we will develop some skills in collecting, recording, and interpreting data about soil environments. We will then apply these data in making some decisions about how to use this land."

Note to facilitator: Both the metric and English systems of measurement already been determined, you should discuss and clecide with the group which assemble used.

DESCRIBING SOIL

Distribute Task A and have the group core, lete it before going to the study sites. (5 minutes)

TASK A

Write your own description of soil. Keep this description for reference later.

II. OBSERVING AND RECORDING THINGS IN THE SOIL

Go on to Task B.

- 1. Have participants do Task B, step 1, before going to study site. (5 minutes)
- 2. Travel to study site and have participants do Task B, steps 2 and 3. (15 minutes)



TASK B	(small groups)		
1. Predic	t what you will tions.	find i	1

 Product what you will find in the top few inches (centimeters) of the area to bill studied. List your predictions.

2 Select an area about 2 feet (61 cm) square on the ground and sift through the top 3 inches (7,6 cm), recording the evidence of plants and animals you observe. Replace the ground in as near original condition as possible.

Name or description of item in the soil	Quantity	Possible effect on soil

3. The terms litter, duff, and humus are used to decome organic matter at the top of the soil. From your study above, complete the following chart.

Term and definition	Describe the feel	List the identifiable parts of plants and animals you found
Litter (identifiable dead things on surface)		
Duff (partially decomposed organic matter - compacted		
Humus (almost completely decomposed nonidentifiable organic matter)		

Questions and Discussion

Discuss the terms litter, duff, and humus. Have participants pick up samples of litter, duff, and humus from the area they're standing on.

- 1. "What did you find?"
- 2. "How do you think the organisms you found affect the soil?"
- 3. "What might be some reasons for the odors in the soil?"
- 4. "Under what conditions would you expect to find more or different organisms?"

III. DEVELOPING THE SKILLS TO COLLECT SOIL DATA

Questions and Discussion

Move the group to a soil profile or soil pit.

- 1. "What do you see as you look at this cross section or profile of soil?"
- 2. "What are some things we might want to find out about this soil?"

Comment to the group, "The various conditions and characteristics of soil that you have mentioned, such as color, texture, structure, temperature, and acidity and alkalinity (pH), affect the way land can be used. Knowledge of these conditions is essential to land use planning, whether in a forest or in your backyard, We are going to collect, record, and analyze some information about those soil characteristics." Distribute Task C and refer to instructions on the back side.



\$1.2

Discuss and demonstrate how to collect data about the following soil characteristics using the instructions on the back side of Task C. This instructional session is extremely important. The participants need the skills they develop in this session when they collect data for the micromonolith. Demonstrate and discuss what you are doing as you proceed, and draw on the participants for most of the observations. For example, in demonstrating texture you may want to have samples of sand, loam, and clay in cans. Have participants feel these samples before determining the texture of the soil layers in the profile. You may want to demonstrate the use of the pH kit in front of the whole group. Use some foreign material such as cigar ashes, a rotten log, or coffee.

IV. CONSTRUCTING A SOIL MICROMONOLITH

Refer to Task C. Explain that there is a place to check or record the data collected and a place to sketch how the soil looks.

Display the materials available (jan only cups, baggies, etc.) and demonstrate how they are used to construct a micromonolith. (45.66

Sketch your soil profile Eibei the Liy	et cor horizons, and record the data
	DATA
PROFILE SKETCH	As temperatures 3 tr. (91.4 cm) above surface Just along surface Contents of layers above top soil (if existing) Latter Duff Homo: Lotal diepth of lazer above top soil
	Lapse thereon! Star Sindy Learny educe Columnar Blacky Plate educar competitive (1.7) in rans costile Record notes the same orternation for the others.
:	19 of the Cook of the field on Kird process.





COLLECTING INFORMATION ABOUT SOIL CHARACTERISTICS

- 1. Soil layers (horizons). Mark where the soil changes color and general appearance. Many soils have three major layers or horizons: top soil, subsoil, and parent material. Because soil formation has many variables, you may find more or fewer layers.
- 2. Color. Describe the color of each major layer, using your own descriptive terms. Moisten soil to get a more accurate color description.
- 3. Texture (how the soil feels). Determine the texture of each major layer. Testure is determined by the feel. Rub a moistened sample of soil between thumb and forefinger. Spit on sample to moisten, if water is not available.

If it feels very gritty and not plastic - sandy

If it feels smooth and slick, or somewhat gritty and sticky - loamy

If it feels smooth, plastic, very sticky- clayey

4. Structure (how the soil is put together in geometric shapes). Determine the structure of each major layer, Carefully break apart a shovelful of soil from lach layer and match its characteristics with one of these structure words: Blocky

Columnar NNN
Granular

Platey

- 5. Temperature. Determine the to a classic each layer. Use the soil thermometer.
- 6. pH (addity or alkalinity). Determine the distof each major layer. Soil pH is an indication of how well certain plants can grow in the soil. Put we will sample of the soil to be tested in a porcelain dish. Do not touch the sample. Use just enough pH read to what side the soil sample. Match the color of the pH reagent at the edge of the soil sample with pH in the major to the soil sample.

Each person should *construct a spicionize ammolith*. (Task C). A micromonolith is a small model of a soil profile in which samples of each soil tages are attached to a card.



V. ANALYZING THE SOIL DATA

After the group finishes Task C, distribute Task D. Discuss this task by reading the instructions with the whole group and going over the first task on soil depth.

It may be important to have local plant identification books, picture keys, etc., for use by participants in interpreting the soil data tables on the back of Task D. (20-30 minutes)

TASK D (individuals or small gro	oups)		
ANALYZING SOIL DATA			
Using the soil data you collected Task, complete the following	and the information provided in the	e soil data tables on	the other side of this
On the basis of soil depth, cor The potential of my soil for w Why?	riplete the following (refer to Table vater storage is		The second secon
2. On the basis of color, complete	te the following (refer to Table II).		
a. The top soll or A horizon			
Amount of organic material Erosion factor : Fertility ::	il		
b. The dramage in the subsurf	lice soil, or 8 barron as	*	· · · · · · · · · · · · · · · · · · ·

3. On the basis of texture, comp	lete the following (refer to Table III)),	
Layer or horizon Topsoil A Subsoil B	Water holding capacity	Looseness	of soil
•	parte the following (refer to Table 1)) V).	
Layer or horizon	Penetration of Water	Dramage	1
Topsoil A Subsoil B		en arrage	Aeration
5. On the basis of pH ranges, con	nplete the following (refer to Table V	√).	
Some plants that could grow plant objet	w here according to the soil pH	Some plants a growing here	etually observed
How well did the plants in the	Study area check out with the pH yo	no measured?	
	naminag <i>es</i> or an as phaow roy wor		Leanstract your swn
6. On the basis of the soil temper soil have growth takin the hasis of soil temperature, w	atures, complete the statement belong place now. I predict that in 3 mon will be	w (refer to Table V oths the growth con-	l)—The plants on my ditions of the soil, on
7. Wrote a soil description about t	this soil using the words from the dail this description with the one you wi	ta you collected and	I recorded on the soil





18

SOIL DATA TABLES

TABLE IN RELATIONSHIPS OF SOIL GEPSH TO PLANT LIROWTH AND WATER STORAGE LABLE IN SOME EFFECTS OF STRUCTURE ON SOIL CONDITIONS

Gris Depth	Water Storage
Geen Scott Cover 4.21 roch tim s	Excellent water storage and plant, prositi
Mad Deep Spir (2011-4211 or 0-6-1-1 m)	Clonic water storage and plant growth
Pallow Suit (2017) Old to land Landers ;	

A TEMPOR A DEBUZONO			
		Calur •	
t sure o	Dark fram gray orner to black	Milideratery harm brown to yell on brown!	Eight (pare brown to entities)
A change as a set	•tojn	• Medium	1.00
Car Corr	3.02 %	Medium	e e per per construire de la construire
Ann. et al.	•teph	Mediturn	1.6
Au re Systemen	High	Medium	
	· tup	Medium	· · · · · · · · · · · · · · · · · · ·

Satisface and only		Condition
and protograms to	1.1	representations contained and

4	manage of the contract of the second	γ -constitut priority to positive dose α , γ , α

Table $r=1.396 \pm 448 \times 10^{10} \times 10^{10}$ off $r \approx 10^{10} \times 10^{10} \times 10^{10}$. Paritiums

· · · · · · · · · · · · · · · · · · ·		
·	t _{io} ,	
CONTRACTOR SERVICES	W. or	
tone the second of the second	P ii i	

Structu		Penetration of water	Drainage	Aeration
Columna	nnn	Good	Good	Good
Blocky	000	Good	Monerate	Moderate
Granuar		Good	Best	Best
Promy	a '	Moderate	Moderate	Moderate

TABLE V. RELATIONSHIPS OF SOIL OF TO PLANT SPECIES.

3.5	4.5	6.5	7	8.5	1.4
(351045)	too	lMast	plants	18,5 to 14 a too	ats alone
acid for mur	v plants)	do bes	t here)	for most places)	
Some examp	iles of soil p	H plant indicati	ors.		
p++ 4 0-5.		endrons, camell d spruces.	ius, azoleas, bi	unberries, some ferns, h	emic - + v same
p= 1: U-6	iq same pi abobe h		daphne, some	spruce, daks, turch willi	
pr 6 0-7		nountain ash, p. wood elm, yelio		aches, carrots, lettucii.	punes firs,
p++ ≥ O-B	0 Mack or	ango, aspatagus	sagebrush, rei	t Ceclar	
'e	These relati	onships may val	y slightly end	ifferent environments	
*					

TABLE . SOME RELATIONSHIPS OF SOIL TEMPERATURE TO PLANT OR 1819

Soul tempe ature	Plant growth during growing teach		
Lines than 40°F (4.4°Z)	No growth, soil bacteria and fungings very active	•••	
40°F 65 + (4.4°C - 18.1°C)	Some growth		
65°F 71 F (18 3°C - 21 1°C)	Fastast growth		
20°F 80°F (21.1°C - 29.4°C)	Same growth	-	
Above 85, 7, 29,4°G1	No growth	• •	

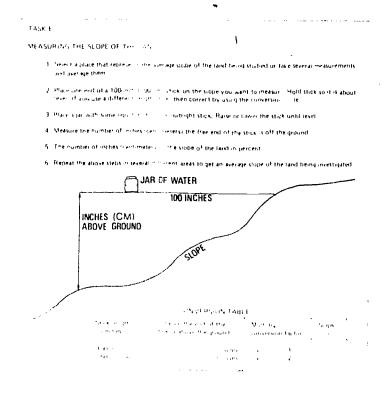


Questions and Discussion

- 1. "Using the observed color of the top layer, and Table II, A and B, what did you say about the erosion factor of your soil?"
- 2. "Using the structure of your soil and Table IV, what did you say about the drainage of water?"
- 3. "How well did the plants in the study area conform to the soil pH plant chart?"
- 4. Have groups read how they would set up their own soil pH/plant chart. Point out that soil scientists determine soil pH and record the plants growing in the area to construct a table or chart for use in interpreting soil pH plant relationships elsewhere.
- 5. If there is a Soil Conservation Service soil survey report describing local soils available, read its description of the soil just studied. Point out that these reports are prepared from the same information we used. Compare the Soil Conservation Service's description with the participants' descriptions. Usually the descriptions are very similar.
- 16. "How does this sail description differ from the one you wrote in Task A?"

VI. MEASURING THE SLOPE OF THE LAND

"In addition to the other data we have collected, measurements of the slope of the land are needed in order to discuss possible uses of the study area. If the slope is varied, measurements from several locations may be needed to obtain a more accurate average." Pass out Task E. (10 minutes)





SI-7

VII. DETERMINING POSSIBLE LAND USES

"Using the soil data you have collected, the slope measurements, and the land use data tables, determine a land classification and possible use(s) for your study site." Distribute Task F. (20 minutes)

į	FA: A r. (Smair diothy)
:	DETERMINING POSSIBLE LAND USES
	Mimispread diversity of land uses requires different sets of criteria that analyze a variety of soil and land factors of different ways. These factors must be considered in determining the most appropriate land use for a given area. The most limiting soil factor will be the major influence to determining the best use of the land. See the Land Use Data Tables for definition of limiting soil factor.
:	Using the data from Tasks D and E and from the Land Use Data Tables, answer the following assessions,
	According to the Land Use Data Tables, this land could be used for:
	1. Agriculture (list and explain why)
	2 Occamancy land uses Roads and streets Building sites Septic tank filter fields Picnic and camo areas
	I feel the best uses of this land would be.
! [Why '



TAND USE DATA TABLES

AGRICULTURAL USES

Directions Circle the item in each of the live soil soil describes each of the live soil factors in the soil you studied. The most limiting soil factor will determine to best agricultural use of the land. A limiting soil factor can be defined as something that will restrict the use or rand for desired activities. The most limiting factor indicates the most appropriate agricultural use.

Slope (%)	Erosion Hazard	Soil Depth	Drainage	Texture	Agricultural Uses
0 3	None	Deep	Good	Loam or silt loam	Farm crops cultivation good soil mnymt, practices
3-20	Slight to moder-	Mod. deep	Somewhat poor	Sandy loam or silty clay	Farm crops—few to several special cultivation practices
20-30	Severe	Shallow	Poor	Sand or clay	Occasional cultivation, many special practices
0.2	None to slight	Deep	Good to	Stony	Pasture woodland cultivation; no machinery, can be used
30-90	Very severe	Deep to shallow	Good to poor	Sandy, loamy, clayey or rocky	Pasture, timber growing, woodland, wildlife, no cultivation machinery
all	None to extreme	Deep to shallow	Excessive to poor	Rockland, river wash, sand dunes	Wildlife, recreation
	Loam is a combin	ation of sand,	silt, and clay p	particles.	

Occupancy land uses

Select the most limiting factor for each land use and record the overall limitation (slight, moderate or severe) on Task F.

Land Uses and Factors Affecting That Use	Slight Limitation	Moderate Limitation	Severe Limitation
Roads and Streets			
Stopes	⊕ 0-12%	12-30%	Over 30%
Depth	Over 40 in.	20-40 in. (50, 8-101,6 cm)	Less than 20 in.
Watertable	Over 20 in.	10-20 in. (25,4-50,8 cm)	Less than 10 in.
Building Sites			The state of the s
Stones	0-12%	12.20%	Over 20%
Depth	Over 40 in.	20.40 in (50.8-101,6 cm)	Less than 20 in.
Watertable	Over 30 in.	20 30 in (50,8-76,2 cm)	Less than 20 in.
 Septic Tank Filter Fields		•	
Stope	0.2%	7.3%	1 Ove 12%
Depth	Over 6 to	4-6 tr (121,9-182,9 cm)	less than 4 in.
Watertable depth below tree h	Over 4 ft	2-4 ft (61.0-121.9 cm)	
Pienic and Camp Arnas		1.	•
Stope	07.	7.15%	Over 15%
Stone	0.20%	20-50%	Over 50%
Watertable during season at use	Over 30 m	20-30 in (50.8-76.2 cm)	. Le than 20 in.







Questions and Discussion

- 1. "What recommendations did you make on Task F?"
- 2. "How do you feel about the present use of this land?"
- 3. "How could man improve the use of this land?"
- 4. "What are some uses which could damage the land? What environmental precautions should be taken to minimize the damage?"
- 5. "How do the things we have done so far relate to making land use decisions?"
- 6. "How do social, economic and political factors affect the development and use of the land?"
- 7. "What are some long-range effects of land use decisions on our society?"

VIII. COMMUNICATING FEELINGS, AWARENESS, AND VALUES

TASK G (individuals or small groups)

In addition to the factors we have collected information about today, list others that influence the way land is used.

Factor	Who is involved	Influence On Land	
`			
		a	
	·		

Select one or two of the above factors and describe what you might do to become involved in determining how the land will be used in your backyard, community, county, etc.

Ask for responses from Task G and discuss.



IX. SUMMARY

- 1. "What did we find out about the environment in our study today?"
- 2. "How can we summarize our discussions and investigations?
- 3. "How are soil characteristics important in environmental management?"
- 4. You may want the participants to evaluate the session by writing how they felt about it.

X. SOME OBJECTIVES

Behavorial Outcome in Knowledge

- 1. As a result of this session each participant should be able to:
 - a. Describe three ways in which the living organisms in the top part of the soil affect the soil
 - b. Construct a soil micronomolith of an assigned soil profile, and determine and record texture, structure, pH, temperature, and color of each layer
 - c. Write a description of a soil studied, using the words recorded about that soil on the micromonolith
 - d. Demonstrate the ability to determine the best uses of the land in this area, using the data from the soil micromonolith and the land capability charts
 - e. Describe three things that man does to determine the proper management of soil resource,

Behavorial Outcomes in Feelings, Awareness, Values, and Actions

- 1. As a result of this session, each participant should be able to:
 - a. Describe how he or she feels about man's effect on this soil environment
 - b. Describe how he or she feels about man's effect on the soil environment where they live
 - c. Describe what he or she can do to improve the use of the soil and in communities.

IX. EQUIPMENT NEEDED (for a class of 30 people)

- 6 La Motte soil pH kits
- 30 micromonolith cards
- 6 tape measures
- 30 sets of lab sheets
- 3 sticks (50"/cm or 100"/cm long)
- 30 sets of task cards and data cards
- 3 staplers
- 1 box of staples
- 2 shovels
- 3 yardsticks (metersticks)

100 jelly cups and lids*

- 3 soil thermometers
- 2 #10 cans of water
- 30 hand lenses
- 3 baby food jars, half full of water

Samples of sand, silt, clay (optional)

Plant samples, drawings, or guides to use with soil pH plant relationship chart (optional)

The tasks and discussion topics in this lesson are designed so that many can be done individually or in combination, depending upon the facilitators objectives and time constraints,

It is suggested by the writers that continual plan revision be done by the people who use this plan.

*Other materials (baggies, plastic wrap, pill bottles, etc.) have been used satisfactorily.



TASK A

Write your own description of soil. Keep this description for reference later.

TASK B (small groups)

- 1. Predict what you will find in the top few inches (centimeters) of the area to be studied. List your predictions.
- 2. Select an area about 2 feet (61 cm) square on the ground and sift through the top 3 inches (7.6 cm), recording the evidence of plants and animals you observe. Replace the ground in as near original condition as possible.

Name or description of item in the soil	Quantity	Possible effect on soil
		-

3. The terms litter, duff, and humus are used to describe organic matter at the top of the soil. From your study above, complete the following chart

Term and definition	Describe the feel	List the identifiable parts of plants and animals you found
Litter (identifiable dead things on surface)		
Duff (partially decomposed organic matter - compacted		
Humus (almost completely decomposed nonidentifiable organic matter)		



ake a micromonolith using the mat	erials provided.
	ers or horizons, and record the data.
e de la companya de l	
·	DATA
PROFILE SKETCH	Air temperatures: 3 ft. (91.4 cm) above surface Just along surface Contents of layers above top soil (if existing): Litter
	Duff
	Humus
	Total depth of layer above top soil
	Topsoil (a horizon): Depthin. (cm) toin. (cm) Color Tex ture: Sandy Loamy Clayey Structure: Columnar Blocky Platey Granular pH Temperature°F (°C) Plant roots visible Record below the same information for the other layers.
	: :
	·
	Describe type of rock in the bedrock (if present).

SOIL INVESTIGATION Task Card Forest Service 1976



COLLECTING INFORMATION ABOUT SOIL CHARACTERISTICS

- 1. Soil layers (horizons). Mark where the soil changes color and general appearance. Many soils have three major layers or horizons: top soil, subsoil, and parent material. Because soil formation has many variables, you may find more or fewer layers.
- 2. Color. Describe the color of each major layer, using your own descriptive terms. Moisten soil to get a more accurate color description.
- 3. Texture (how the soil feels). Determine the texture of each major layer. Testure is determined by the feel. Rub a moistened sample of soil between thumb and forefinger. Spit on sample to moisten, if water is not available.
 - if it feels very gritty and not plastic -- sandy
 - If it feels smooth and slick, or somewhat gritty and sticky loamy
 - If it feels smooth, plastic, very sticky- clayey
- 4. Structure (how the soil is put together in geometric shapes). Determine the structure of each major layer. Carefully break apart a shovelful of soil from each layer and match its characteristics with one of these structure words: Blocky

Columnar IIIII
Granular
Platey

- 5. Temperature. Determine the temperature of each layer. Use the soil thermometer.
- 6. pH (acidity or alkalinity). Determine the pH of each major layer. Soil pH is an indication of how well certain plants can grow in the soil. Put a small sample of the soil to be tested in a porcelain dish. Do not touch the sample. Use just enough pH reagent to saturate the soil sample. Match the color of the pH reagent at the edge of the soil sample with pH color chart.

Each person should construct a soil micromonolith (Task C). A micromonolith is a small model of a soil profile in which samples of each soil layer are attached to a card.



TASK D (individuals or sr	nall groups)		
ANALYZING SOIL DAT	A	•	
Using the soil data you co Task, complete the follow	llected and the information provided in the ing.	soil data tables on	the other side of this
The potential of my so	oth, complete the following (refer to Table I)		··································
	omplete the following (refer to Table II).		
a. The top soil, or A ho	orizon:		
Erosion factor	material		
b. The drainage in the	subsurface soil, or B horizon, is:		
3. On the basis of texture	complete the following (refer to Table III).		
Layer or horizon	Water holding capacity	Looseness	of soil
Topsoil A		Looseness	01 3011
Subsoil B		 	
4. On the basis of structur	e, complete the following (refer to Table IV).	
Layer or horizon	Penetration of Water	Drainage	Aeration
Topsoil A			
Subsoil B			
	es, complete the following (refer to Table V		actually observed
	in the study area check out with the pH you graph how you would set up an experiment		d construct your own
suil have growt	temperatures, complete the statement below h taking place now. I predict that in 3 mont sture, will be	(refer to Table V hs the growth con	l): The plants on my ditions of the soil, on
7. Write a soil description micromonolith card. Co	about this soil using the words from the data mpare this description with the one you wro	you collected and te at the beginning	d recorded on the soil

SOIL DATA TABLES

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TABLETY	market and before a contract	216,4,1060	on son governous	٠,
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$ \delta \alpha_k = 1 + 2 \log (\delta_k) = -2 (\delta_k) \alpha_k$	The only of water specific in the paper in swift	•
. The continuous contribution $4\varphi = \rho(\psi) + 3(4) \phi(\psi)$	for advanter stock en and plant, provide	•
The sound of section of the manager of	Show water storage in Chland growth	

Section 1	Parago	Satisfic Comme	t	je tris rae	April
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		final		dodet ite	Magazie
(r.angjař	_	CHOOL		311	Best
Photos (9	Stortecate		toderate	Moderate

TABLE B. SOME RECATIONS/RPS OF COLUMN TO SOIL COMOTHONS.

6. It had not remarked

;		Calor			
e andre la	Cark (daze grev Lessan na historia	Moderately dark (brown to yellow- brown)	Light libely brown to yellow!		
Amount of Jugura, material	rtigh	Messure	Low		
Frasion factor	L. A	Medium	High		
Amation	Hi-jh	Vertion	low		
A unitable dastronen	e e., je	Medium	Low		
Contribute	Muh	Medium	Low		

TABLE V. HE LATIONSHIPS OF SOIL OF TO PLANT SPECIES.

3.5	4.5	6.5	, ,	85	14
13.5 to a 5 acid for in a		(Most do bes		(8.5 to 14 is too for most plants)	#kaline
Some e (arri	الإلىوار ووالنا	H plani indicati	ors		
pH 4 0-5		endrans, cumell I spruces.	as, azaleas, tili	unperries, some ferns, b	emiocks, some
bit 6 0-6	O Some pir rhodule		ifaphne, some	Spruce, oaks, turch will)w,
ы 6.0-7		ountain ash, p wood elm, yella		Nuhes, carrots, lettuce, l	Diries firs.
рн 7.0-8	0 Mock ora	inge, asparagus	. Saqebrush, rea	d certar	
Hote	*			Ifferent environments	

B. SCHSURFACE SOIL 19 HORIZON

's itisser table soul ordine	Condition	- 1
Dult gray of action emotion gods (177)	Gater-togged soils, prior amotion	
Kelling hart brown, trace fill in thresh sous;	Fell dramed sons	
Mighthus pay of me arms souls	Somewhat proofly to poorly drained soils	

TABLE γ_{L} SOME RELATIONSHIPS OF SOIL TEMPERATURE TO PLANT GROWTH

Scal temperature	Plant growth during growing season
Less than 40°F 14 4°C)	No growth, soil bacteria unit fungi not very active
40°F 65°F 14.4°C - 18.3°C1	Some growth
65°s 10°s (18,3°C 21.1°C)	Fastest growth
70°F 85°F (211°C 294°C)	Some growth
Above 85° F 179 4° C1	Nis growth

TABLE OF SCHEDEFFETS OF TEXTURE ON SOIL CONDITIONS 1

	Time trans	Waren housing consecty	t Lauseness of soil	1
,	Same,	Pogr	Good	•
	E 10-y	aread to excellent	Goud	•
	t.taye,	High owner bein too, nightly hip prince used	· P _{regs}	٠
٠.			•	

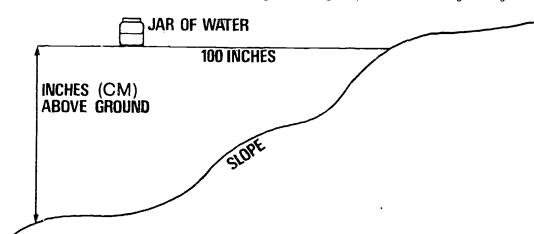




TASK E

MEASURING THE SLUFE OF THE LAND

- 1. Select a place to less represents the a large large of the land being studied in take several measurements and everall measurements.
- 2. Place one place one control (100 cm) stick as the clope you want to measure. Hold stick so it is about level of the correct by using the conversion table.
- 3. Place a jur and entered in it on the outright stick. Raise or lower the manufactured until level.
- 4. Measure the number of inches (centimeters) the free end of the stick is of the ground.
- 5. The number of liches (centimeters) is the same of the land in percent.
- 6. Repeat the active steps in several different smeas to get an average slope of the land being investigated.



CONVERSION TABLE

Stick length (inches)	Distance the end of the stick is above the ground	Mult. by		r	Slope %
100 in. (cm) 50 in. (cm)	in. (cm)	x x	1 2	=	



TASK F (small groups)			
DETERMINING POSS	د ل		
	·	fferent sets of criteria that analyze isidered in determining the most apple major influence in determining the ing soil factor.	3
Using the data from Tasks D 🤫	∟ d *	n the Land Use Data Tables, answer th	on following questions.
According to the Land Use $\Omega_{\rm c}$	1.317	: land could be used for:	
1. Agriculture (list and	why)		
2. Occupancy land use Roads and streets Building sites Septic tank filter fi≜d Picnic and camp arek			
Fichic and camp area			

TASK G (individuals or small groups)

In addition to the factors we have the cated information about today, list others that influence the way land is used,

Factor	Who Is Involved	Influence On Land
ı		
-	-	
	· 	

Select one or two of the above store and describe what you might do to become involved in determining how the land will be used in your $b_{c_{ij}}(z)$ as community, county, etc.



LAND USE DATA TABLES

ACRICUL FRALUSES

Directions Cardle the item in each of the five columns below that best describes each of the social social test and the social social test and the social test and the

SOIL FACTORS							
Stope (%)	Erosion Hazard	Soil Depth	Drainage	Texture	Agric u		
0 3	None	Deep	Good	Loam or silt loam	Farm crops currivate good soil might, practice.		
3-20	Stight to moder-	Mod deep	Somewhat poor	Sandy loarn or silty clay	Farm crops fev al special cultivation prace		
20 30	Severe	Shallow	Poor	Sand or clay	Occasional cultiv. https://occasional.cultiv.html		
0-2	None to slight	Deep	Good to	Stony	Pasture-woodland as ation; no machinery can be used		
30 90	Very severe	Deep to shallow	Good to	Sandy, loamy, clayey or rocky	Pasture, timber growing, woodland, wildlife, no cultivation machinery		
all	None to extreme	Deep to shallow	Excessive to poor	Rockland, river wash, sand dunes	Wildlife, recreation		

Occupancy land uses

Select the most limiting factor for each land use and record the overall limitation (slight, moderate or severe) on Task F.

Land Uses and Factors Affecting That Use	Slight Limitation	Moderate Limitation	Severe Limitation
Roads and Streets			
Stopes	0 12%	12.30%	Over 30%
Depth	Over 40 in.	20-40 in, (50.8-101.6 cm)	Less than 20 in.
Watertable	Over 20 in.	10-20 in. (25.4-50.8 cm)	Less than 10 in.
Building Sites			
Stopes	0.12%	12-20%	Over 20%
Depth	Over 40 in.	20-40 in. (50.8-101,6 cm)	Less than 20 in
Watertable	Over 30 in.	20-30 in (50.8-76.2 cm)	Less than 20 in.
Septic Tank Fifter Fields			
Stope	0.7%	7-12%	Over 12%
Depth	Over 6 ft.	4-6 ft. (121,9-182,9 cm)	Less than 4 in
Watertable depth	Over 4 ft.	2-4 ft. (61.0-121.9 cm)	Less than 2 ft.
below trench			
Picnic and Camp Areas			
Slope	0.7%	7-15%	Over 15%
Stones	0-20%	20-50%	Over 50%
Watertable during season of use	Over 30 in.	20-30 in. (50.8-76.2 cm)	Less than 20 in





SOME WATER INVESTIGATIONS

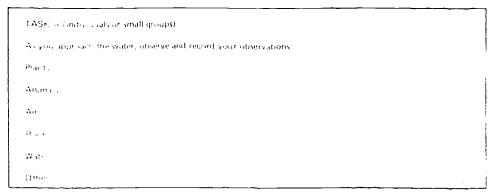
Set the stage for the vestigation by reviewing quickly at will take piace in the allotted time. For this investigation, s_{ij} and des_{ij} op some skins in collection and intercollection data about the water endowed. We will then apply these ds_{ij} or door using the role of water in the environment and our society."

Note to facilitator, with the metric and English systems of measurement are included in the lesson plant to this not already been determined, you should discuss and decide with the girab which system will be used.

I. OBSERVING THE WATER ENVIRONMENT

Distribute Tas- A.

"As you appreach the water, record your observations on Task A." (10 minutes)



Questions and Discussion

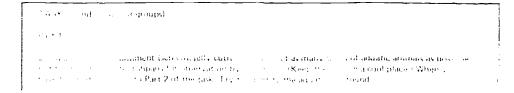
1. "What are some things you noticed as you approached the water?"

II. OBSERVING AND COLLECTING AQUATIC LIFE

Questions and Discussion

- 1. "What do you notice about the water environment?"
- 2. "What are some factors that affect the leves of animals in water."
- 3. "Where would you expect to find animals in a water environment?"
- 4. "What are some guillelines that we need to consider in collecting aquatic life so our investigation will cause the least import on the environment?"

Pass out correcting equipment. Go on the Task B. (30 to 40 minutes)



Investigating Your Environment Series
Forest Service
1976



WI-1



HE IDENT FING AT REPORDING AQUATIC ANDIAL

Have q_{ij} as identification of the aquatic insects they found as possible, using the aquatic life drawings on back q_{ij} and q_{ij} and q_{ij} and q_{ij} are the books provided. (20 min; q_{ij})

and the acte of this	172 - 113 50 - 100	ande Pond Life" books, or sim- mitify the specimens you four-		nanuals, and patture keys on the other con as you have finished.		
List or sket. "	13	் வ found, Return animals to water				
Desc	v i ye	- found		Tytel (nam	arsketch)	How many Cornmon name
				• .	-	
			•			· • • · · · · · · · · · · · · · · · · ·

Questions and Discussion

- 1. "What animals are you find?" (You might compile a group list, preferably on a chart. Each person could record his over (1.)
- 2. "Where did \sim , find most of the steedimens?"
- 3. "What other is would you expect to find in the irream?"
- 4. "What he same things we could do with the lat an amimals?"

IV. PREDICTIONS VALTER THARACTERISTICS FROM AQUATIC ANIMALS FOUND

Distriting firsk where the bas pof the aquatic animals you found, and the tables in Task C, predict the temperation, program C count. (16 minutes)



	17 to Machine Annie 1 communication and the communication of the communication and the c
TASK Compositions	
On the to γ . A the advance area is you found, the takes $\gamma = \lambda \gamma$ asservable is predict the following characteristics of this section.	\sim Data section below, and Los.
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And temperate All the high game	***************************************
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pht will be tause	a management of the second of
Departed Operant will be be a beautiful to be a second of the second of	** ** 1
The real of that was	
Free these chadreness to future use	

AQUATIC DATA

Tuber Large Stanges That Support Aquatic Late.

11081	MEL	MOST ≐LKALINE			
1 4	5 6 7	=	10 11	12 1	14
Settle 1 10				0	
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is part, $t > test, etc.$	მ 5			12.0	
"Carro eackers not be					
Forme inserts	6.0	9 (-			
Bass crapper	6.5	<u>,3</u> 5			:
Solar clams musicis	<i>:</i>	9.6			
Largest variet, of					
animals (trees may).					
statetty, car i vi	6.5				

Table II Down Grown Requirement of the emand Other Aquatic Life.

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Cold water or the reduced by a strain of marking and above

Water water than the reduced of the strain of the strain and carp) tables or the strain of the s
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Tuble 17 - Foregor state a logges and proximately Regulated for Certain Organisms

	Estrem (t)	Excesses of life
		Mach plant life imany fish diseases Most bass, crapped bloogalt, carp, catfish, caddisfly
Majrie 12		conditionant (decisione fish diseases) soon (topic) of methy, may be hadded by writed Mes
	ir:	To an addition of the may the



V. MEASURING AND RECORDING WATER CHARACTERISTICS TO TETT OUT PREDICTIONS

"One way to test the predictions is to use this Hach Water O_2pH Testing F_0 , or equivalent). Open m=kit. The instructions are inside the lid. There are lots of jobs to be done in testing (clopping squirting, swirfing, dipping, counting, reading, etc.), so make sure everyone in the group has a job to do."

Pass out Task D (and Data Card on the reverse side). Have group transfer the $\pm \epsilon$ edictions from Task C to Task D and record the test measurements beside the predictions for comparate

Each group of three to five people takes a kit, and spreads out along the edge of the water.

Do not demonstrate the use of the kit. Let the particle of the instruction and learn to use the kit as they collect the data. You should check among the groups of they work to make such they use the right bottles, chemicals, etc. (20 minutes)

Questions and Discussion

- 1. "How did the test results compare to the predict lead".
- "Under what conditions might we expect to get different results than we did day?"
- 3. "What can we say about the quality of the water the attream so far?"
- 4. "What else would we need to know to decide whether or not to drink this wais?" (Coliffrim pagneric maint)





Make Sure () eryone 1. Using the water te the attention ponic Record the data bi		up Gets Ir	ivolved in	thu Tree	*				
the Restout pone	st kit, detern								
	1				ratore, d	issolved	oxygen ur	ount, and	pH of
Name of Stream, F	ond or Lake	:							
incation of water san		Te	mperature	For	(C)			Usa	ble
edge or middle of sw pank of pond, etc.)	^{Harn} Taken	w	ater	!	\ir	b	H	Oxyge (mg/	n (ppm) liter)
	•	e My pred.	! Actual test	My pred.	Actual :	•	Actual test	My pred,	Actual test
	• •	•	•				<u> </u>		
	•	•	• ••		•				
	•				!		li		
and Pentrusion (Transformation flow Transparency of fa and distribution for the and distribution of the transport and and the	W far I could ke and pond kt, which is I painted whi the disk disa	see into valers ca owered of te and big oppears.	in be roug n a line ur ick in alte	hly deter itel it can rnative q -	mined by no longe uadrants,	the use r be seen Very lit	of a white i. It is app tle sunligh	e and bla proximate pt pentral	ely 8 tes below
Lower the Seath) of water to the disk at On the basis of the	nd record		, ft. (or m	etersi					of the
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Temperature Layer On the basis of the in Table III sescrib	ing (pond or temperature	lake) s you reco	orded for inpening i	n the wa	nd, this sec ter now	ison of y	ear, and t	he inforr	nation

VI. MEASURING WATER VOLUMES FOR STREAM, POND, OR LAKE

(For a stream, use Part 1; for a pond or lake, use Part 2.)

Part 1. Stream Measurements

Questions and Discussion

- 1. "How many people do you think could live off the water in this stream (domestic water use only)?
- 2. "What measurements do we need to know in order to determine the amount of water in this stream?" Discuss how to make different measurements. Work Task E, Part 1,

Questions and Discussion

- 1. "How many people could live for 1 day (domestic use only) off the water in this stream?"
 - 2. "How did your prediction compare with your measurement?"
 - 3. "What would happen to this environment if we piped all the water at this point to a community?"
 - 4. "If we were goint to use some of this water, how much should be left to flow downstream? Why?"
 - 5. "What might affect the amount of water in this stream?"
 - 6. "How important is this stream to a community? To the environment here?"

Part 2. Pond or Lake Measurements

Questions and Discussion

- 1. "How many people do you think could live off the water in this pond or lake?" (domestic water use only)
- 2. "What measurements do we need to know in order to determine the volume?" Work Task E, Part 2.

Questions and Discussion

- 1. "How many people could live for one day (domestic use only) off the water in this pond?"
- 2. "How did your prediction compare with your computations?"
- 3. "What might affect the amount of water in this pond?"
- 4. "What would happen to this aquatic environment if we drained it?"
- 5. "If we were going to use some of this water, how much should be left to minimize damage to the pond environment?"
- 6. "How important is this pond to the environment?"



Test Electromag	
Part Carmina	
I structions for italiands the	ng recording streamblew measurements
Characteric applications, sug	stitute meters for feet and liters for gallons ;
es tour, wer 25° _{Gr} 30° To noe apsteram m _{etale} er. Bee Herrard celawii S _{love} erheer	Goat this bance along a straight section of voice stream. If you can if the bid 100' or ask districts (6 or 6 inches long or 12 7 or 15 2 cm free) in the water above can't the number of seconds it takes to float distriction between the markers is the 100 bont distrince by the total seconds, it took the stock to float between tights also the stock for float between tights are the stock for the stock for the second.
transation.	
26d meisurement = 100 ft. 3cd meisurement = 100 ft.	Total St. per second
in a normal 100 to _{ot a} thal	(If the second)——(If per second average) (your end on of the stream. Measure the width of the stream at three places (neer divide the total by three to get the average width of the stream.
Second thi _{spar} ethic Peed introduction	tt (average worte)
3. Find the average death of pross the stream variable. First conducting and Stream Second the hadronic for all conducting artering.	f your dectain of the storie. Measure the depth of the stream in times places right line, then divide the total by four to get the average depth of the stream of the stre
ther on pairs, arthur, by think statements of architical think was a setting to a things. 201	case three depth measurements then divide by four is to take into account tream. It can be explained by the following example of a drawing of a epit. If three places in A(3): B(10) and C(5), (total 20), find an average 3 - 6.2 3. Now look at the area or average depth (0), which is 5' grade by four - 20' - 4 - 5', the correct average depth.
a time the stake for the	ter te ^{re} Second. Multiply the average wedth, average depth, and the number are second. (A rabin foot is water in a container 1 foot wide, 1 foot high, and as, A rabin meneral water is the amount in a container 1 meter wide, 1 meter (1,000 foots).
American American writte dupth	Number of Cabin teet of water feet Dir second flowing per second
continue against successful district	rand 200 gallons (757 stees) of water a day for name use. (This does not a switter used for hoping services and reduction and comment of layer).) In a prople could get their water needs for Tiday from this stream, complete
See and the see of	Continue in Vis. tr. Gallions of water of water out second
the consequences of	Security of manyte Gallons of Autor or order
Top social with the Mose To Commence	1700 Cols Total number of water in the water water water water water water water with water wat
the second of the second	dream



TASK E (in groups)
dan 2 - For Pond of Jake
artions for collecting and γ , along γ , γ , of water in a bond be lake:
metric applications, a contain in others to a feet and liters for gallons.)
cod the iserage dame of the element of the pond. Measure the length and width of the pond. You have to take elements as the length average of them.
Problem 1 $\frac{t_1}{t_2}$ Problem 2 $\frac{t_1}{t_3}$ This is the first surface. Average character $\frac{t_1}{t_3}$ This is the first surface. (area of poord)
2. Fund the average detailed in the same of or sake. Measure the depth in three places along a line (transect) across the pond, as less the same of accuracy is desired, repeat this process along additional tunnects and everage results are successful. First measurement
Total to 4 to (average depth)
**IOTE: The reason you take indee depth measurements then divide by four is to take into incount the shallow areas of the stream. It can be explained by the following example of a drawing of a stream or use of the literature of the stream o
Silvierri da for com. The potential pas of water in pond. Cut ft. A report point of a report of Volume in cut ft. Cut ft. Cut ft.
Virginia in dui militari in Number of gals, water in pend
(A cubic foot of plane)—the water in a container 1 foot wide, 1 foot high, and 1 foot long, 7.48 gallons, A cubic meter of water is the amount in a container 1 meter wide, 1 meter high and 1 meter long, or 1,000 fiters.)
2. Formally for competers the come using acre feet of water. No meter equivalent included) a. (Surface) And of pand in feet accomage death in feet. Volume oul ft.
Volume on the manner in acre feet of water.
Acre feet Ga Street (a) Mumber of gallons in bond
The average person is allocated 200 gallons (757 liters) of water a day for home use. (This does not seffect each person's lare of water used for public services and industrial and commercial uses.)* In order to find out how many persole could get their water needs for 1 day from this pond, complete the following calculations.
Gallions of water consider one person are the bond and the bond are seen of the bond are seen or day. 5 Office of Education Techniques are the bond



VII. DETERMINING WATERSHED BOUNDARIES

Distribute Task F and a map of the area in which you have been working. .

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	with sold	es of sur-evatershed. We are or the
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	A the cool A three only At a chart set on this watershool	thought change the characteristics of this water? Ways the actuary might change the characteristics of the water.
	A the cool A three only the control of the control	thought change the characteristics of this water? Ways the actuary might change the characteristics of the water.

Have participants get into small groups and write a description of what they think a watershed is. Have groups share their definitions with the other groups.

Finish Task F. (10 minutes)

Questions and Discussion

- 1 "What activities did you list and how did you think they would change the water characteristics?"
- 2. "Are any of these evident here?"
- 3. "How would we find out more about this watershed?"



VII. COMMUNICATING FEELINGS, AWARENESS, AND VALUES

Have participants complete Task G. (10 minutes)

Factor	Who Is Invalved	1
* G * 100	Wild Is mydived	Influence on Water
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	İ	
	1	

Ask for responses from Task G and discuss.

VIII. SUMMARY

- 1. "What did we find out about water from our investigations today?"
- 2. "How can we summarize our discussions and investigations?"
- 3. "What are some methods and processes we used in our investigations in this session?" (May be useful for first field sessions to identify processes used in the investigation)
- 4 You may want the participants to evaluate the session by writing how they felt about the session.



IX. SOME OBJECTIVES

Behavioral Outcomes in Knowledge

- 1. As a result of these activities, each participant should be able to:
 - a. Identify the boundaries of the stream (pond or lake) watershed on the map provided
 - b. Predict the pH, temperature, and dissolved oxygen count of the stream or pond, using the list of aquatic animals found
 - c. Demonstrate the ability to test out the above predictions using the water testing kit
 - d. Measure the cubic feet of water per second flowing in the stream, or in the pond, and determine what size community could live off the water measured
 - e. Describe three ways this stream or pond is important to the surrounding environment.

Behavioral Outcomes in Feelings, Awareness, Values, and Action

- 1. As a result of these activities, each participant should be able to:
 - a. Describe in writing how he or she feels about man's effect on the aquatic environment at this site
 - b. Describe at least one action he or she can take in everyday life to help improve the way water is managed in the —

Horne

Community

Consumer habits

- c. Describe the benefits of each of the above actions
- d. Describe the implications of water use and management in our society.
- X. EQUIPMENT NEEDED (for a class of 30 people)

4 Water testing kits (Hach Co.

or equivalent)

4 Thermometers

4. White dishpans

30 Sets of lab sheets

Task cards

Data cards

1 Secchi disk

30 Jelly cups, baby food

jars, etc.

30 Hand lenses

15 Pond Life books

(Golden Nature

Guides)

30 Maps of the area

1 50-foot or 100-foot tape

4 Screens

Markers

Chart paper

The tasks and discussion topics in this lesson are designed so that many can be done individually or in combination, depending upon the facilitators' objectives and time constraints.

It is suggested by the writers that continual plan revision he done by the people who use this plan.

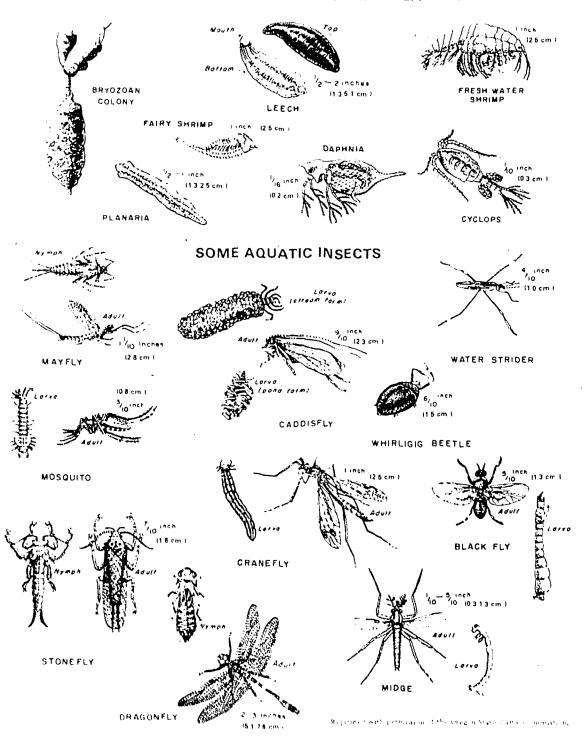


TASK A (individuals or small groups)			
As you approach the water, observe and re	cord your observations.		
Plants		and the manufacture of the	the state of the state of the state
Animals			
Air			217 MM 1 11 11 MM 1 M 1 MM
Rocks		One of the original section is a second section.	
Water		e de la companya de la companya del la company	n in a graph the same of the companion o
Other .		a see alaa aa a	The state of the s
TASK B (individuals or groups)			
Part 1			
Using a collecting equipment (screens, jelly Put them in the white dishpans for observa have finished, move on to Part 2 of the tasl Part 2 Using the "Golden Nature Guide Pond Life side of this card, generally identify the spec	ation by the group. (Keep the pans in the k. Try to identify the aquatic life for the action of the control of	n a cool place.) V und.	Vhen you
List or sketch the animals you found. Retu	arn animals to water as soon as you	nave finished.	
Description of where found	Type (name or sketch)	How many	Common
	!		
	e.		
	1.24		

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SOME SUB-SURFACE FRESH WATER ORGANISMS



1.)

r	ASK C. (individuals)
	n the basis of the ago itid unimuls you found, the tables in the Aquabic Data section below, and your overvations, predict the following characteristics of this stream
ŧ	preda t that the. Nater temperature well be because
	Air temperature will be because pH will be because
1	Dissolved Op count will bebecause
1	tre color of the water or
K,	eep these predictions for future use

AQUATIC DATA

Table L. pH Ranges That Support Aquatic Life.

MOST ACID		NEU	TRAL		MOST ALKALINE				
1 2 3 4 5	6	/	8	9	10	1.1	12	13	14
Bacteria 1.0			.,,					13.0	
Plants			-						
falgae rematest, etc.	6.5						12.0		
Carp suckers and a									
softer anserts	6.0			90					
Bass crappie	6.5								
Sparts, clams - Sec		7.0		9.0					
Largest variets (*)									
animals (tr. 15 and 117)									
stoneffy, (ar. 159)	6.5	15							

Table II Dissolved Oxygen Requirements for Native Fish and Other Aquatic Life

production and the second of t	
t xamples of Life	D. O. in parts per million
C Children 1 (1)	or milligrams per liter
	A WAS NOT THE TAX OF THE PARTY
İ	
Cost water organisms, including salmon and frout the	elow (i8 - f.)
Spawrong, growth and well being (caiddisfly, ston	etly mayfly). 6 ppm and above
Warm water organisms (including game fish such as l	bass, crappin, cat fish and carp)
The Advisor Fill Follows	
 (powth and well being (some cadd)s fly) = 5 ppm 	and above
· · · · · · · · · · · · · · · · · · ·	

Jamo 19 Temperature Ranges (Approximate) Required for Certain Organisms

	Lomper dans (Falurenheit)	Example, of life
1	- Greater (18 об 68 ° E (20 °C) - жет жате	Much plant life, many tish diseases. Most burs, crapner, bloomil, carp, cathely, caddistly
	Matitle (1996 - 55 - 68 - 5 - (12.8-20 ° C)	Some plant life some too diseases frailment front stonetty, maylly, caldfully water bentles
	Low range theorethan obj. E. (128°C) — cold :	Trout eachists storott, mayby

WATER PAYESTIGATION Lask Card Long Service 1976

WE15



TASK D (groups of 3-5)

Make Sure Everyone in Your Group Gets Involved in the Testing.

1. Using the water test kit, determine the water and air temperature, dissolved oxygen count, and pH of the stream or pond.

Record the data below, using predictions from Task C.

Name of Stream, Pond or Lake:

My Actual My Act	Location of water sample	rime	Tei	mperature	e (°F or °	°C)			Usable Oxygen (ppm)	
Water Productivity and Color On the mass of the color you recorded in lask C and Table I (See Data Card reverse side), what can you say an at this water? Light Pentration (pond or lake) My estimate of how far I could see into water (from Task C) isft. (or meters). Transparency of lake and pond waters can be roughly determined by the use of a white and black plate (called a seech disk), which is lowered on a line until it can no longer be seen. It is approximately 8 inches in diameter, painted white and black in alternative quadrants. Very little sunlight pentrates below the point at which the disk disappears. Lower the Secchi disk into the water until it can no longer be seen. Measure depth from surface of the water to the disk and recordft. (or meters). On the basis of the depth of the Secchi disk and Table II, what can you say about the water? Temperature Layering (pond or lake) On the basis of the temperatures you recorded for your pond, the season of year, and the information	(edge or middle of stream bank of pond, etc.)	Taken	Water		Air		На		1	
On the basis of the color you recorded in lask C and Table I (See Data Card reverse side), what can you say act this water? Light Pentration (pond or lake) My estimate of how far I could see into water (from Task C) isft. (or meters). Transparency of lake and pond waters can be roughly determined by the use of a white and black plate (called a secchi disk), which is lowered on a line until it can no longer be seen. It is approximately 8 inches in diameter, painted white and black in alternative quadrants. Very little sunlight pentrates below the point at which the disk disappears. Lower the Secchi disk into the water until it can no longer be seen. Measure depth from surface of the water to the disk and record ft. (or meters). On the basis of the depth of the Secchi disk and Table II, what can you say about the water? Temperature Layering (pond or lake) On the basis of the temperatures you recorded for your pond, the se-son of year, and the information					,	1		1	,	Actual
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On the basis of the depth of the Secchi disk and Table II, what can you say about the water? Temperature Layering (pond or lake) On the basis of the temperatures you recorded for your pond, the season of year, and the information										
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On the basis of the temperatures you recorded for your pond, the se-ison of year, and the information	My estimate of how far Transparency of lake ar (called a secchi disk), winches in diameter, pair the point at which the r Lower the Secchi disk is water to the disk and re	I could some property of the could some property of the court of the c	waters ca owered or e and bla opears, vater unt	n be roug n a line ur ick in alte il it can n . ft. (or m	hly deternial it can rnative q o longer eters).	rmined by no longe juadrants. be seen. M	the use r be seer Very lit Measure (of a whith a lt is appointed the sunlighted depth from	e and bla proximat nt pentra m surface	ely 8 tes below
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On the basis of the temperatures you recorded for your pond, the se-ison of year, and the information	My estimate of how far Transparency of lake ar (called a secchi disk), winches in diameter, pair the point at which the Lower the Secchi disk is water to the disk and re-	I could some property of the could some property of the court of the c	waters ca owered or e and bla opears, vater unt	n be roug n a line ur ick in alte il it can n . ft. (or m	hly deternial it can rnative q o longer eters).	rmined by no longe juadrants. be seen. M	the use r be seer Very lit Measure (of a whith a lt is appointed the sunlighted depth from	e and bla proximat nt pentra m surface	ely 8 tes below
	My estimate of how far Transparency of lake ar (called a secchi disk), winches in diameter, pair the point at which the Lower the Secchi disk is water to the disk and re-	I could some property of the could some property of the court of the c	waters ca owered or e and bla opears, vater unt	n be roug n a line ur ick in alte il it can n . ft. (or m	hly deternial it can rnative q o longer eters).	rmined by no longe juadrants. be seen. M	the use r be seer Very lit Measure (of a whith a lt is appointed the sunlighted depth from	e and bla proximat nt pentra m surface	ely 8 tes below
	My estimate of how far Transparency of lake ar (called a secchi disk), winches in diameter, pair the point at which the Lower the Secchi disk i water to the disk and re On the basis of the dep On the basis of the tem	I could so the point of point which is longer than the vector of the country of t	waters ca owered or e and bla opears. vater unt Secchi d	in be rough a line ur ick in alte il it can no .ft. (or m isk and Ta	hly deter traitive q o longer eters). Ible II, w	rmined by no longe under the seen. Me seen. Me hat can you	the use r be seen Very lit	of a whith the sunlight depth from the sunlight depth depth from the sunlight depth from the sunlight depth	e and bla proximat nt pentra m surfact water?	ely 8 tes below

WATER INVESTIGATION Task Card Forest Service 1976



Fible F. Relationships of water color to productivity

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Table III - Temperature Layering in Ponds - Laxes

in summer, the surface water absorbs the sun's heat and warms faster than the water below. The warmed vater is lighter than the cold water, so it floats on the cool layers, By midsummer there are there distinct layers.

During the summer, mixing or circulation is prevented by these stratified layers of water which act as a transfer.

The upper layer of water cools in autoinn until it approaches the temperature of the water in the middle and lower layers. Aided by winds, the surface water since causing circulation from the to bottom.

in source, the cold surface water continues to sink and the water becomes stagnated, photoconnests slows, and oxygen levels drop.

fer suking, aided by winds, another circulation and mixing occurs, called the "Spring feature".

orasonal Change (Diagram Signores



- initigation succession.

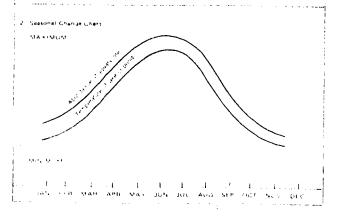
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During spring and fatt Overrunns, the temperature of the instair is equalized throughout the lake. Fishes and uther anunts are more ective than in winter but last active then in summer.



dutivity is greatly remoind during the winter black animals internate in the mud or debris at the bottom.





TA as Exerged app. Port L. For Stream or projeta resilier contents grand, econtent streams lower in comments. (For metric application, substitute meters for feet and it is for gailons). 1. Measure and mark a 100 foot distance along a straight lection of your stream. If you said thou a 100' without que 25, or 50°. Iteraw a stack (5 or 6, or mes) is a 12.7 or 15.2 an longer in the water above the upstream marker. Record the combined second in takes to float downstream between the markers. Request helics. Now discrete the 100 foot distance by the total seconds of took the stick to float between the stakes. The this, triple times and use the agerage time Lit meas promoted 100 th (+ _ _ _ ings on of feet stick efestance Hotal amonds to float 100 ft.) Hour is each second! tr per second 2nd instructionent 100 ... to per enable 3rd menormore 100 to Total (ft per sego 3 _____ Off per a condiaverage: 2.3 Court envice specification of our action of the areas. Measure the water of the stream at three places (1999) $z_{\rm c}$ main the 100 food year then divide the total by the z to get the average z dth of the stream. Exil magazenance First management 6. See and stoakerment 6. See and stoakerment 6. See a see 2.2.2.2.2. Section Applications ft (average width) 3. First the average death of year vection of the invited. Measure the death of the stream in three blaces minus the stream in a straight line, then divide the first by four to get the average depth of the stream, First maggarament 46. Second maggarament 41. This community or ement 11 Totals and a control of the A. Campanian P. (average depth) No.)) $E = E_{\rm the}$ reason you take three death measurements then decide by four is to take into account the shallow areas of the steam. It can be explained by the following example of a drawing of $\mathfrak a$ stream or as section. If depth in their places in A(3), B(101) and C(51), Itotal 201), find an average is, its along the three 30-3 , 6.23 . Now look at the area or average depth 101 , which is 5° Fine total of depths and divide by four $-20^{\circ}-4-5^{\circ}$, the correct average depth. 1. Final training the first increases and Maltiply the average width live are depth, and the mamber school the 2006 to premiod on the death of water and confidence of foot wide. I foot high, and The artifact of 148 access. As also instead water of the amount in a continue it meter wide. Umgter in a property of the artifactor of the second of 000 Stery states. Mornsten of Cities test of water feet part second. traiving per second. is 1.5 we assuming the war lases, provide 200 gallons (25.7 liters) of water a day for home use. (This does not not occupant a main sistems of mater used for public services and industrial and commercial uses of the in fer his fixed, not have many smooth could get this water needs for Aday from this streams compacte the folio's high probations. transport of the Street Congress of the Gunning at Sate CH 2 100 of A don proprietarial Garania Sar from mach, or storage, Contraction of the Contraction more and a de-A Marian News and discounting of Lista patients of American of States Tatal number of a deciden ane person sains people who could et dady waters. mil 13, meds from this 5210.310 Specifical Contraction

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STATE OF STREET ASSESSMENT OF COLUMN

TASK E (in groups)	
Part 2. For Pond or Lake	
Instructions for collecting and recording volumes of water in a bond or take.	
(For metric application, substitute meters for feet and liters for gallons.)	
1 Find the average diameter (distance across) of the poind. Measure the length and width of the p. You may have to take several length and width measurements and get average of them.	
Pond widthft Pond lengthft. Totalft $2 \cdot \underline{\hspace{0.5cm}}$ ft. taverage diameter) Average diameterft, \times 3,14 () \pm 4 $\cdot \underline{\hspace{0.5cm}}$ sq. ft. surface, (area of pond)	
2. Find the average depth of the pond or lake. Measure the depth in three places along a line. (trusses across the pond, as near the middle as possible. Add these depths and divide by four (see expectation below) to get the average depth. (If additional accuracy is desired, repeat this process along additional transects and average results.) First measurement	
NOTE. The reason you take three depth measurements then divide by four is to take into account the shallow areas of the stream. It can be explained by the following example of a drawing of a stream cross-section. If depth in three places is A(5'), B(10') and C(5'), (total 20') find an average by dividing by three 20' 3 6.2.3'. Now look in the cross conclude denote which is 5'. Take total of depths and divide by the 20' 4.4.5' transfer to average depth.	
· · · · · · · · · · · · · · · · · · ·	
3. Formula for computing number of gallor of wister on pond. aX	
(A cubic floot of water is the water in a container 1 foot wide, 1 foot high, and 1 foot long, 7,48 gailor. A cubic meter of water is the amount in a container 1 meter wide, 1 meter high and 1 meter long, or 1,000 liters.)	
4 - Caregula for computing the volume user place their of water. (No meter equipment sticluded) a "Sortace)	
b 43,560 acre feet of water. Volume oul ft (sq. ft in an acre	
Acre feet Galf acre foot Number of quions in pond	
5. The average person uses about 200 gallons (757 liters) of water a day for home use. (This does not reflect each person's share of water used for nublic services and industrial and commercial uses.)* In order to find out how many people could get their water needs for 1 day from this pond, complete the foliowing calculations.	
Contains of water Amount of water one person Total number of people who could on the pand sees periday get daily water needs from this pond. **Office of Education.**	



TASK F (small groups)		
Describe what you think a wate	ershed is.	
and the state of t		
Find your location on this strea	am (pond, lake) on the map.	
	_	
Where does the water come from Where does it go?	m?	
Where does it go?	ies of our watershed. We are in the	
Where does it go?	ies of our watershed. We are in the	
Where does it go? Draw lines around the boundar watershed. What act after the watershed. Activity	d might change the characteristics of this water? Ways the activity might change the characteristics.	
Where does it go? Draw lines around the boundar watershed. What act after the watershed Activity	d might change the characteristics of this water? Ways the activity might change the characteristics.	istics of the water
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Where does it go? Draw lines around the boundar watershed. What act after the watershed Activity	d might change the characteristics of this water? Ways the activity might change the characteristics of the characteristics of this water?	istics of the water

WATER INVESTIGATION Task Card Forest Service 1976



TASK G (individuals or small groups)

In addition to the factors we have collected information about today, list others that influence the way water is used.

Factor	Who is involved	Influence on Water
•		
	·	
		. •
		·

Select one or two of the above factors and describe what you might do to become involved in determining how the water will be used in your home, community, county, etc.

a lesson plan for

SOME FOREST INVESTIGATIONS

Set this stage for this investigation by reviewing quickly what will take place in the allotted time. For example, "In this session we will develop some skills in collecting, recording, and interpreting data about the forest, and then communicate these interpretations using different methods and processes."

Note to facilitator: Both the metric and English systems of measurement are included in the lesson plan. If it has not already been determined, you should discuss and decide with the group which system will be used.

I. OBSERVING AND INFERRING WITH CROSS SECTIONS.

Distribute cross sections of trees 4" - 6" (10 - 15 cm.) in diameter that show a variety of growth patterns and influences (fire, insects, etc.).

Have people spend a few minutes looking at the cross sections (5 minutes).

Questions and Discussions

- 1. "What are some of the things you noticed about the cross section?" (List on board.)
- 2. Point to two or three items from the list that deal with growth characteristics and rings (varing widths of growth rings, center not in the middle, etc.).

 "What are some possible reasons for ______?" (Select some observations.)
- 3. "In general, what could growth rings tell us about a group of trees?" (competition, climate, temperature)
- 4. Pass out Tasks A and B. "This is what we just did and here is the task card for your reference later."

 Refer to the information on Task A about tree growth rings.

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II. COLLECTING AND INTERPRETING DATA ABOUT TREE GROWTH RATES AND COMPETITION

Task C (with tree cores) requires preparation by the facilitator before the session.

A tree stand should be selected for study, four to five trees tagged, numbered, and bored, and their diameters taken. Trees to be selected should show effects of environmental conditions—injury, overcrowding, lack of sunlight, etc. The tagged and numbered trees smould be bored with an increment borer by the facilitator ahead of time. Cores should be numbered corresponding to numbers on trees. Taping tree cores to cardboard with see-through scotch tape or in plastic straws will help keep them longer if liquid resin is not available. In any event, keep the numbered cores and trees to use again. This eliminates the necessity of reboring the trees.

You may be able to find and use stumps of trees that grow under a variety of competititon influences, instead of using tree cores.

Steps 1-3 in Task C are all planning steps in setting up an investigation and should be done away from the study trees.

Questions and Discussion

1. "Observe the tree core that your group has been given and record the information in step 1 of Task C." Pass out hand lenses, pencils, the numbered tree cores taped to cardboard, and Task C.

TASK C Igraup	of 4 5)			
	ree core vour group has be of tree core to help interpi			
Тенн #	Number of dark rings from conter to bark (auprox lige)	R	emarks about the ring patterns	
	DRAWI	NG OF TYPICAL	TREE CORE	
CENTER	ART COUNTING HERE	111111111111111111111111111111111111111	LAST YEAR'S GROWTH-	BARK
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	out has recorded the info		n from the group should but this inf k.C. steb 2	OFMALION
Hecord the fo diameter info		t tree cores from t	ne master chart. Instructor will provi	de the
Tren s	; — Za arrither of Javk rings — In him constructions — Espains — Japes — Espains — Japes	Dometer of tree truns for 31	Remarks about the ring pattien	,
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- 2. Have each group tell you the information for the number of dark rings from center to bark and remark about the ring pattern while you record on the large chart (see Task C, step 2). "What does this tell us about the trees these cores came from?"
- 3. Now put the diameters on the large chart and have everyone record them on Task C, step 2. Ask, "Now what does this added information tell us?"
- 4. "Go on to Task C, step 3. Pick out two or three trees from the chart that show differences in growth and set up an investigation to find out why there are differences."
- 5. Have the groups take Task C to the area where the trees are tagged and numbered. Have them spend 10-15 minutes doing the investigation and completing Task C, step 4.
- 6. (Outdoors) When all groups are finished, ask for a 2-3 minute summary from each group. "What did you find out?"
- 7. "What are some of the major factors that you think are affecting the growth of this forest?"
- 8. "What does the information tell us about the past events of this environment?"

III. OBSERVING EVIDENCE OF CHANGE

Pass out Task D.

Questions and Discussion

- 1. "What evidence of change (natural and manmade) might there be in this environment?"
- 2. "Spend the next 20 minutes looking for evidences of change and recording them on Task D."

atural and manmade) in the en ins.	vironment.
What might have caused them?	Effect on the environment
•	
1	What might have caused

Questions and Discussion

- 1. "What evidences did you find?" Have group develop a total list. Record on chart in front of total group, if possible,
- 2. "What could we do with this list?" This is a key question.
- 3. "Get into groups and put the whole list into a sequence." (Possible activity)



FI-3

IV. OBSERVING AND RECORDING THINGS ABOUT A ROTTEN LOG OR STUMP

Move the group to a rotten stump or log.

- 1. "Let's focus in on one evidence of change in this rotten log (stump)."
- 2. Pass out hand lenses and demonstrate how to use them (many people have never used one before).
- 3. Pass out Task E. "Notice that on Task E it says, 'Do not tear the stump apart!' Why do you think this note is there? Spend 10 minutes observing the log and recording your observations on and interpretations of Task E."

Record your observations and ideas below.				
*Living things	Effec	t on stump		
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	•	The state of the s		
	,4,			
	•			
*Nonliving things	Effec	t on stump		
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	•	The second control of the second seco		
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!. In the space below, con	struct a diagram of one o	of the "cycles taking place in the rotten log or stump:		
The optional visitors, GOTT	20 our a magnan on one (or the eyeles taking place in the rotten log or stump:		



Questions and Discussion

1. Ask for volunteers to share what their diagram or cycle looks like. If appropriate, comment how people defined and distrated the word cycle differently.

V. COMMUNICATING INTERPRETATIONS THROUGH SKETCHING AND WRITING.

Distribute sketching paper and pieces of charcoal from a campfire or fireplace.

Questions and Discussion

- 1. "Sketch the log or stump you just studied, using charcoal from a campfire or fireplace. Other sketching materials will be given to you as you work." Subject of sketch depends on the environment. It can be anything that is significant about the area, a rotten log, stump, snag, old homestead, fence, barn, city building, transmission tower, or freeway.
- 2. While people are sketching, go around and give them rotten wood, brown dandelion leaves, green dandelion flowers, and other goodies in season.
- 3. If you're not in the woods, improvise.

Begin this part when about half the people finish their sketch.

Questions and Discussion

- 1. "Use your pencil or pen. Find a place on your sketch (across the bottom, or down the side) to write some things as I give you the directions."
- 2. Give these directions to the group:
 - a. "Write two descriptive words about the stump (words that tell what it looks like)." Repeat instructions.
 - b. "Write three action words about the stump (words that describe processes or changes taking place, or things happening to it)." Repeat instructions.
 - c. "Now write a short phrase that tells how the stump affects the rest of the environment (a phrase describing its value or usefulness or a phrase describing any thought you have about the stump)." Repeat instructions.
 - d. "Write one word that sums up everything about the stump (a word that suggests a comparison, an analogy, or synonym)." Repeat instructions.
 - e. (Optional) "Now, if you wish, go back and give a title to what you have written."
 - f. "Congratulations. You have just written a poem about the stump or whatever you sketched."
- 3. Have people read their writings if they wish.



VI. TRANSFERRING THE PROCESS TO OTHER ENVIRONMENTS

This could be done inside, depending on outside conditions. The same processes could be used to investigate other environments.

TASK F	
List some other things in this environment tha	at could help us further interpret the forest.
Things in the forest	What it can tell us about the forest
	•
Identify and list some of the methods and pro	ocesses we used today in our investigation.
Describe how we could use these methods and (city, schoolyard, etc.).	I processes in another environment to find out more about it

VII. SUMMARY

- 1. Discuss Task F.
- 2. "What did we find out about the environment in our session today?" (List on chart, if there is time.)
- 3. "How are these things important to the way we manage the environment?"
- 4. "How can we summarize our investigations and discussions today?"
- 5. You may want the group to describe in writing how they felt about this session.

VIII. SOME OBJECTIVES

Behavioral Outcomes in Knowledge

- 1. As a result of these activities, each participant should be able to:
 - a. List at least three observations about the cross-section provided, and infer possible reasons for each observation.
 - b. Describe ways to set up an investigation to find out more about the above observations and inferences.



F1-6

- Set up an investigation (collect and record data) to find out reasons for growth rate differences in a given stand of trees.
- d. Describe activities appropriate to other environments for interpreting the landscape.
- Identify and list at least three evidences of change in the environment, and infer the cause-and-effect relationships of those changes.
- f. Construct a diagram of a cycle in a rotten stump.

Behavioral Outcomes in Feelings, Awareness, Values, and Action

- 2. As a result of these activities each participant should be able to:
 - a. Describe how he or she feels about one change in this environment.
 - b. Communicate feelings of awareness by constructing a sketch of a given object in the environment, using natural materials,
 - Communicate feelings, awareness, and values by describing in writing the effect of a given object on the
 environment.
- 1X. EQUIPMENT NEEDED (for a class of 30 people)
 - 30 Cross sections of trees
 - 6 Increment cores (preferably in plastic) from numbered trees
 - 30 Hand lenses (optional)
 - 30 Pieces of sketching paper

Lab sheets

Task cards

Natural materials for sketching

The tasks and discussion topics in this lesson are designed so that many can be done individually or in combination, depending upon the facilitators' objectives and time constraints.

It is suggested by the writers that continual plan revision be done by the people who use this plan.





TASK A (work in small groups)

Write down some things you notice about the cross sections.

TASK B (work in small groups)

Select three observations about the cross sections from the group list.

List possible reasons for these observations.

List ways you could set up an investigation to find out more about your observations and inferences.

Observation (What you noticed)	<u>Inferences</u> (Possible reasons for this)	<u>Investigations</u> (How we could find out)	
1.			
2.			
3.	La La		

Tree Rings Information.

The current year's growth is the ring next to the cambium layer just inside the bark. The rapid spring growth is a lighter color that the growth made in the summer, so one light and one dark ring makes one year's growth. It is easier to see and count the summer wood or dark rings to determin the age of a stump or log of a tree when it was cut.

These rings are easily counted on the stumps of cut trees.



How old was this tree when it was cut? _____ The dark rings are summer wood and the light rings are spring wood. One light and one dark ring makes one year's growth.

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ASK C (groups of 4-5)		
. Observe the tree core your group ha	s been given and rei	cord the information.
See drawing of tree core to help into	apret the tree core	you have been given.
Number of dark ring Free = from center to back (approx. age)		Remarks about the ring patterns
	1	
DRA	WING OF TYPICA	L TREE CORE
ENTER T START COUNTING HERE		LAST YEAR'S GROWTH FBA
		111111111111111111111111111111111111111
on the blackboard or easel board. Cl	hart should be like T	rson from the group should put this information ask C, step 2. In the master chart. Instructor will provide the
Number of dark ring Tree # from center to bark (approx. age)	Drameter of tree trunk (cir. ÷ 3)	Remarks about the ring pattern
1	•	
2		
3		
4		
5		
6	•	
4		
Set up an investigation to find out role. a Select two or three trees from the b. Which trees did you select? (indic. Why did you select these trees?	e list that show diff	erences in growth rates.
Go with your group to the site of th	in trans was calacter	for investigation
a Collecting and recording data: R		
b Interpreting data: Record possib		
c. Summarizing your investigation.	Write your group's	summary below, including:
What you were trying to fir What data you collected ab What interpretations you m What other data would you	iout∋t nade	investigation.



Look for evidence of change (natural and manmade) in the environment. Record and fill out other columns.		
Evidence of changes in the environment	What might have caused them?	Effect on the environment

TASK E (individuals or groups)

Do Not Tear The Stump Apart!

1. Record your observations and ideas below.

	*Living things	Effect on stump
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	· · · · · · · · · · · · · · · · · · ·	
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i		
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•	•	
1	*Nonliving things	Effect on stump
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٠.		

2. In the space below, construct a diagram of one of the cycles taking place in the rotten log or stump:

*You define the word cycle any way you want to.

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TASK F	
List some other things in this environment	that could help us further interpret the forest.
Things in the forest	What it can tell us about the forest
	•
Identify and list some of the methods and p	processes we used today in our investigation.
,	
Describe have an application of the months to	
(city, schoolyard, etc.).	and processes in another environment to find out more about it
	:



a lesson plan for

INVESTIGATING SOME ANIMALS AND THEIR ENVIRONMENT

Set the stage for this investigation by reviewing quickly what will take place. For example, say: "During this lesson we will collect and interpret information that will help us identify some relationships that exist between animals and their environment in this area."

Note to facilitator: Both the metric and English systems of measurement are included in the lesson plan. If it has not already been determined, you should discuss and decide with the group which system will be used.

OBSERVING AND MEASURING ANIMAL SIGHTINGS AND EVIDENCE

Questions and Discussion

- 1. "What animals would we expect to find living in this area? (Vertebrate, invertebrate)
- 2. "What are the needs of these animals?"
- 3. "What are some names of the places where animals live?"
- 4. "Where would you look for animals around here?"
- 5. "What habitat conditions exist in this area that would be important to the animals?" (Vegetation, soils, moisture relationships, temperature)
- 6. "What evidence might we find that animals have been here?" (Sightings, sounds, smells, tracks, droppings, nests, burrows, partially eaten food)
- 7. "What are some guidelines that we need to consider so our investigation will cause the least impact on the environment?" List on task A.

Pass out Task A and go over instructions. (30 minutes)

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Δ1-1





task.	1.	List guidelines to use in minimizing the impact you will have on the environment while doing this
2. Explore as many places as you can from		task.
2. Explore as many places as you can from		
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3. Observe and list different habitats for animals in the area (grass, cultivated fields, hedges, etc.) 4. List animal foods observed in the area.		or evidence, or signs of animals (feathers, nests, scat, tracks, partly consumed food, etc.) and the
3. Observe and list different habitats for animals in the area (grass, cultivated fields, hedges, etc.) 4. List animal foods observed in the area.		
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Questions and Discussion

- 1. Discuss Task A.
- Pass out Task B and go over instructions. (30-45 minutes)Have the group use the area used in Task A as one habitat if you want to.

II. COMPARING HABITATS

TASK B (small groups)

1. Select three different habitats in this area and record the data in the chart. Give each habitat a name based upon the characteristics that you record.

Habitat	1		111
Characteristics			
Name of Habitat			
Name and numbers of animals or evidence	•		
		•	

2. What could account for the similarities and difference among habitats?

Questions and Discussion

- 1. "What habitats did you explore?"
- 2. Break into three groups and have each group put the data for one habitat from Task B on a large piece of paper. Have each group put their display up and report on it (characteristics, animals there, or evidence). Use three different habitats. Record responses on board.
- 3. "What could account for the differences and similarities of the habitats?"
- 4. "What are some other animals that might live in the different habitats?"
- 5. "After looking at this information and our discussions, what can we say about habitats?"





III. OBSERVING AND DISCUSSING ANIMAL ADAPTATIONS

"Animais are adapted to their environment in many ways. What characteristics of an animal would we look at in determining why it lives in a particular habitat?"

Pass out Task C and go over instructions. Discuss Task C when group has finished. (20-30 minutes)

TASK C

List some things about the animals in this area that would enable them to live here.

Think about the characteristics, traits, and adaptations of the animals you have found in this area or that we would expect to find living here.

Fill in the following chart.

Animal	Things that enable them to live here (characteristics, traits, adaptations)	How it helps them live here
1.		
2.		
3.		
4.		
5.		

Optional Activities

If appropriate, during these activities say something such as: "The purpose of these activities is not necessarily to name the animals, although many of you know them from past experience. The purpose is to observe the different parts of animals up close and to make some inferences about where they live, what they eat, etc. If you are interested in the names of these animals, there are specific books on animal identification.

1. Animal Adaptation (20 minutes)

This activity can be done with the actual animal parts (skulls, pelts, stuffed mammals, and birds) or by using pictures of different animals cut or copied from encyclopedias, national wildlife magazines, Golden Nature Guides, Peterson field guides, etc.

Put the following parts of animals into separate piles and have about three or four participants around each pile.

- 5-6 skulls (carnivores, omnivores, herbivores)
- 5-6 study specimens (weasel, skunk, mole, chipmunk)
- 5-6 pelts (bobcat, coyote, fox, other raccoon)
- 5-6 birds (woodpecker, grossbeak, flicker, bluejay, hummingbird)

a. Adaptations of one part of an animal

Tell participants to list any types of adaptations that they can observe that will help infer: What type of habitat the animal might live in, where in the food chain it might be, and where this animal might live in the environment (names of animals are not important). Each group will then report their findings to the other groups.



AI-4

At the end of each presentation, ask any questions that migh draw more information out of the group. For example, if the group didn't infer that the coyote and fox had developed the sense of smell, sight, and hearing because of a long nose, forward eye sockets and large ears, ask the group: "On the basis observable characteristics, which senses do you think have been highly developed in these two animals?" (If groups ask you questions about animal's names, etc., tell them to wait until we try to put some of the different group's reports together.)

b. Matching pelts and skulls

Put three or four skulls and the matching pelts or study specimens in the center of all four groups. Tell them, "Would somebody please match the skulls with the other parts of the animals?" Let the group solve the task without help from the facilitator.

After they have finished this part, say: "Each group had only part of an animal, so, on the basis of observable maracteristics, they could only make certain inferences. Now, by adding another part of the animal and by mooling each group's observations, we know more about the animal."

c. Constructing a food chain using animal parts

"Let's try something else." Put the mole, chipmunk, weasel, and coyote skulls and bobcat skin in a pile. Tell them, "Would somebody build a food chain from these parts of animals." After they have done that, say, "We have now put more data together to further interpret our information about these animals." Perhaps let each person draw or sketch the food chain.

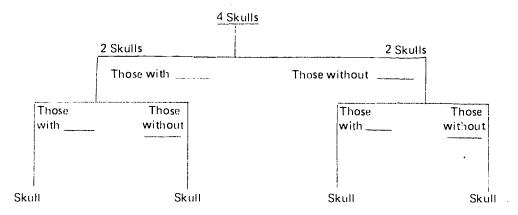
2. Classifying Tooth and Mouth Adaptations for Food Use (20 minutes)

a. Developing a key

Give each group of five to eight a group of four to six skulls to classify. Among the skulls to classify it is desirable to have those from carnivores (fox, bobcat), herbivores (muskrat, chipmunk), and omnivores (bear, racoon).

Instructions:

- "Observe the skulls that you have been given. Look at the characteristics of their teeth and/or mouth."
- "Place the skulls into two piles on the basis of similarity and difference of their tooth or mouth characteristics. Try to use observations rather than inferences."
- -- "Make a large key on flip chart paper, starting with the two piles that you've made. Write the reason for the two piles you've made."
- "Continue to divide the two piles into two more piles and write the reason. Continue dividing the skulls until each has been singled out."



"Leave your skulls and key and rotate to a key which another group has made. Try to place their animal skulls in the appropriate places on their key."



A1-5

- b. Grouping skulls by tooth structure
 - "Using the observations you made in developing your key, place the skulls in the three following categories:"
 - Mainly sheering back teeth that cut like scissors carnivore (meat-cutting)
 - Mainly grinding back teeth, like human back teeth herbivore (mant-eating)
 - Both grinding and sheering back teeth, or teeth modified to do both cutting and grinding · omnivore (plant- and meat-eating).

, IV. EXPLORING RELATIONSHIPS BETWEEN ANIMALS AND SOME ENVIRONMENTAL FACTORS

Food Chains

- "One relationship among animals living in a particular environment is a food chain showing what animals eat and who eats them."
- 1. "What characteristics of an animal would we look at to determine what it eats?"
- 2. "What characteristics of an animal would we look at to determine what other animals eat it?"
- 5. "What do we mean vises we talk about predator/prey relationships?"

Pass out Task D and go over instructions. (10 minutes)

TASK D

. Using the information from Tasks A and B is onstruct at least a five-stage food chain that shows predator/prey relationships.

Questions and Discussion

- 1. Have groups share their food chains.
- 2. "How can numbers of animals help you determine a animal's position in the food chain?"
- 3. "How can animal adaptations help you determine a animal's position in the food chain?"

Energy Cycle

- 1. "Food chains illustrate the movement of energy through a portion of the environment,"
- 2 "What do you think would happen to the food chain if that was the extent of energy flow in the environment?"
- "Think about the diagram in Task E; place the appropriate organisms from your habitat in the appropriate places and draw arrows."

Pass out Task E. (15 minutes)



1 1 /		
	Plants	
light	•	Herbivores (plant eaters)
\mathcal{M}	·	:
)
	•	•
Nutrients .		
	1	
•		
		Carnivores (meat eaters)
	Death	
	Death	
	Death Decomposers (bacteria, fungi)	
	Decomposers	

Questions and Discussion

- 1. "What is the function of each part of the energy cycle?"
- 2. "What do you think would happen if the group you selected was removed from this ecosystem?"
- 3. "How cloes the energy cycle relate to a food chain?"
- 4. If no one talked about the decomposers, ask what they think would happen if that group were eliminated,

Relationship of Animals to the Environment

- 1. Pass out Task F and animal data cards, "Select one animal of your choice or use one of the animal cards and evaluate the area as to the suitability of the area for that animal." Ask people to take different animals so the area is evaluated for a variety of animals. Have reference guides to get information about different animals.
- 2. "Many times we use only our own value system in evaluating things for other people or purposes. It may help you, therefore, to do this task for the animal you picked by assuming the role of that animal." (30 minutes)



AI-7

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Working with another person, evaluate this area for one animal. Fill out the animal data card below before doing the task, or use the data for one animal on the back of this card.

	The state of the state of the second for the state of the
Animal Data	ANIMAL
	Where it lives
	Food needs
	Predators
	Other (adaptability to man, life span, reproduction rate, etc.)

- 1. How would you rate the area for the animal's following needs:
 - a. General habitat
 - b. Winter and summer food supply
 - c. Evidence of predators for your animal
 - d. Other factors
- 2. How many of your assigned animals or their evidences did you find in the area?

List some relationships you think exist among the animals of the same species already living there.

How might the animals react to others of the same species moving in?

3. Which of the habitat types will these animals use?

Where will they probably locate home, nest, den or burrow? Why?

- 4. What are some ways that this species of animal affects this environment?
- 5. Summanze how the animal assigned to you might react to living in this environment,

Questions and Discussion

- 1. "What do you think are some of the relationships among animals that live in this area?"
- 2. On the basis of our observations and discussion so far, how can we summarize the relationship between animals and their environment?"

ERIC C

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V. DISCUSSING CHANGES IN ANIMAL HABITATS

Questions and Discussion

- 1. "Are habitats always the same?"
- 2. "What kinds of influences can cause changes?"

Pass out Task G. (10 minutes)

TASK G

Describe in writing three influences that you observed that have changed the habitats in this area and the cause and effect relationships that occurred.

Consider

- a. Lindence of change, influence that cause it
- b What the area may have looked like before the change occurred and the animals that lived there then
- c. What the area looks like now and what animals live there
- d. How the change affected the habitat and the animal species that did and do live there.

Questions and Discussion

- 1. Have individuals read their descriptions and compare different descriptions.
- 2. What evidences did you find that show man's influence in this area?

VI. COMMUNICATING FEELINGS, AWARENESS, AND VALUES

Go on to Task H. (10-15 minutes)

Factor		Influence on Animal	
		The second state with all the advantage of the second seco	
•			



Ask for responses from Task H and discuss.

Optional Activity - Designing a Model Animal

"In our investigations today we have discussed some adaptations that animals have for living successfully in their environment. Let's put these adaptations together and design a model animal to live in one habitat found here."

Instructions: "Working in pairs, design a model animal that you feel would be best adapted to one habit found here. When you have finished, give your animal a name that seems to sum up its characteristics."

"Consider the following ideas in your sketch and identify the parts of the animal, that you designed for the items listed below and any other items you consider:"

- 1. Adaptations for food gathering
- 2. Adaptations for defense, protection
- 3. Adaptations for seasonal changes
- 4. Major foods required (kind and amount)
- 5. Amount of habitat required for needs
- 6. Value of animal to environment.

VII. SUMMARY

- 1. Discuss results of Task H.
- 2. "What did we find out about animals in our field study session today?"
- 3. "Why are animals important in the environment?"
- 4. "How can we summarize our discussion and investigations today?"
- 5. "What methods and processes did we use in our investigations today?"
 (This may be useful for the first field session to identify processes used in the investigation.)
- 6. You may want the participants to evaluate the session by writing how they felt about it."

VIII. SOME OBJECTIVES

Behavioral Outcomes in Terms of Knowledge

- 1. As a result of these activities, you should be able to:
 - a. Identify and describe three different habitat types
 - b. Identify and describe six different animal adaptations
 - c. Construct a diagram of a food chain or an energy cycle using the evidences of animal life observed
 - d. Describe possible adaptations of certain animals that enable them to live in a particular environment.

Behavioral Outcomes in Terms of Feelings, Awareness, Values and Action

- 1. As a result of these activities, each participant should be able to:
 - a. Evaluate one habitat for a particular species of animal
 - b. Describe three things that come down in everyday life that will make the energy cycle and consumer habits more efficient and that will cause the least amount of harm to the ecosystem
 - c. Design and sketch an animal well adapted to a particular habitat.



Al-10

IX. EQUIPMENT NEEDED

Golden Nature Guides - zoology, mammals, fishes, reptiles, and amphibians

Task Cards

Animal data cards

Four or five each of animal skulls, skins, study mammals, birds, or pictures of the different parts of animals (for optional activities)

The tasks and discussion topic in this lesson are designed so that many can be done individually or in combination, depending on the facilitators' objectives and time constraints.

It is suggested by the writers that continual plan revision be done by the people who use this plan.





TASK	CA (individuals or small groups)	
1.	List guidelines to use in minimizing the impact you will have on the environment while doing this task.	
2.	Explore as many places as you can from	
3.	Observe and list different habitats for animals in the area (grass, cultivated fields, hedges, etc.)	
4.	List animal foods observed in the area.	

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TASK B (small groups)

1. Select three different habitats in this area and record the data in the chart. Give each habitat a name based upon the characteristics that you record.

Habitat		11	III
Characteristics		·	
	,	·	
	,		
Name of Habitat		TO THE REPORT OF THE PERSON OF	
Name and numbers of animals or evidence			
[] [

2. What could account for the similarities and difference among habitats?

TASK C

List some things about the animals in this area that would enable them to live here.

Think about the characteristics, traits, and adaptations of the animals you have found in this area or that we would expect to find living here.

Fill in the following chart.

Animal	Things that enable them to live here (characteristics, traits, adaptations)	How it helps them live here
1.		
2.		
3.		
4.		
5		
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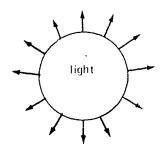


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Using the information from Tasks A and B, construct at least a five-stage food chain that shows predator/prey relationships.

TASK E

List the animals or their evidences you have seen in the appropriate places in this diagram. *Put in arrows*. What other words and ways can you think of to illustrate a similar cycle?



Plants

Herbivores (plant eaters)

Nutrients

Carnivores (meat eaters)

Death

Decomposers (bacteria, fungi)

What would happen if the group were eliminated?



for one animal. Fill out the animal data card below be not the back of this card. ANIMAL Where it lives Food needs Predators Other (adaptability to man, life span, reproduction rate, etc.)
ANIMAL Where it lives Food needs Predators Other (adaptability to man, life span, reproduction rate, etc.)
ANIMAL Where it lives Food needs Predators Other (adaptability to man, life span, reproduction rate, etc.)
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reproduction rate, etc.)
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nimal's following needs:
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their evidences did you find in the area?
among the animals of the same species already living \cdot
of the same species moving in?
nimals use?
nest, den or burrow? Why?
\$

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5. Summarize how the animal assigned to you might react to living in this environment.

COTTONTAIL HABBIT



Drappings small * RC 1.4 × J. 6 cmdiemeter, can to brown inound lifessy

Burrovs hidden in brushir coaces. Small 4: 5 1119 2 12 3 cml diameter.

Narrow well-wore trade and resting forms under brosh closess.

Small two parameters and to as above σ_q togeth charks main to provide level

Existence

DEER MOUSE





Oroppings small 1, 10" of R" (Ungloblang, shaped like rice (Huns).

Burrows 3:4" 1" (1.9-2.5 cm) diameter in the ground under fallen logs. Ness may be found in old buildings, in Bumirs, or even in standing data tries. Qually grass and diszn construction.

Fropty seed hulls from pine spruce and fir units, ecorps

Bignes found in old pellets and droppings of predaturs

i galaria

MULE DEER



Scat. Houndah vellett about 1.4.1. to 6 crol diameter, from black to ten in polar, usually a dozen as recover in one place.

Hair on tenois, hollow hijs, itc., prep-

Horst so capito to a sixty in Consistency

ng (ARETA) in orderly those its with open alternate weodland dreak with open sonit patches, cover to hide in, and with winter food supply important Wheel cover and broady fance rows good habitat areas.

> FOOD NEEDS—(summer) Many green succulent plants, weed seeds, grass, (winter) Small twigs and bank, Birch, willow and someoused.

POPULATION: One rabbit per 4 acres (2 hictorist is considered a good suppliation. Two facults per acre is considered high.

PREDATORS

On adult unit young. Minst fourfriored, winged, and reptilian predators, plus nain.

HABITAT Meady every dividand habitat is occupied winnishere by this species Falests in instants, deserts, or combinations of the

FOOD NEEDS - Seeds, nuts, acoms insects. Stones food for winter

POPOLATIONS 5.10 mile per acre (1.2 nectare) is considered normal 10.15 mice per acre is considered tool.

PREDATORS - Own, hawks, royotes, coob, ars incurse cars, fox, shanks, weasin snakes, whicst all meat naturs.

HABITAT Couler forests, desert stroot, enaparcal grassland with stroot, band who is forest if prowse plants present.

FOOD NEEDS: Shrubs and twips must of the year, glass in spring. Favored foods include new growth of bitterbrish, incompan mahrisany, cholecthery. Will two ear septimals, jumper, pine and

POPULATION: Variable density. May be 10.50 per sill more in whiter range, 2.4 deer per Guare into (0.6 diguare km) in austroir.

PREDICTORS Man dog congar, coyote

TESHITORIALITY Graphous in writer (can live together)
LIFE SPAN (2-10 years, 7-10) ESPHING - One or two takes per year
CONSTRUCT WITH MAN

Evisence





Dog-like proppings with hair, often light colored.

Partially consumed remains of animals, beautiones broken.

Dens under trees, rocky areas, logs, with openings 11-1,51 (.3-5 m) in diameter.

lands brushly and boulder-stressn areas Usually not more than 6 miles (9,6 km) from rater. FOOD NEEDS. Small railents, rabbits,

HABITAT - Princies, desert, open woods

FOOD NEEDS. Small roderits, cabbits, inde, almost any weak or oil animal, the young of most animals, viejetation, carrions, almost anything.

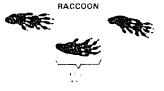
POPULATIONS: One per sq. mile where found. Hunting route about 10 miles 16.9 km)

PREDATORS: On young bolicats leagles, dogs, On adults in the

EFFE SPAN 2-10 years
OFFSPHING One litter of 5-10 pubs
year
OUTE TERRIFORMAL

QUITE TERRITORIAL COMPATIBLE WITH MAN

Evidence



Denz in hollow trees, caves, logs, ground tiurrows. Opening 1' (.3 m) diameter.

Scat loose, often found on logs, and often contain shells of crayfish, fresh water claims, seeds, etc.

HABITAT Wooded areas along streams and lakes, corn fields

FOOD NEEDS - Principally fruits, nuts, grains, insects, crayfish, bird edgs, almost anything

POPULATION One animal perits acres is considered high. Depends on food supply.

PREDATORS Man dag, covote.

TERRITORIALITY. Not a strongly territorial animal

LIFE SPAN 10-14 years
OFFSPRING One litter/year. Average of

lour/litter
DOES NOT TRULY HIBERNATE
COMPATIBLE WITH MAN
OTHER: Meat edible, animal printarily
nocturnal, valuable furbearer

Evidence

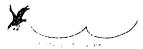
WOODPECKER

The sound of tenning or drumming.

Urill holes in dead trees, logs, fence posts, and telephone poles.

Nests in 1.5"-3" (3.8-7.6 cm) diameter holes in trees, posts, etc.

Sightings of black and white birds that show a "dippod" Bight pattern.



HABITAT Forests with some dead trees may use telephone poles, add buildings, etc.

FOOD NEEDS: Eats wood-boring insects, grubs, wood ants, insects.

POPULATION: About one pair of wordspeckers for every 40 acres (16.2 hectares) of forest land is marked.

PREDATORS: (Almost no animals bother woodpeckers) Opossums, snakes, and some kinds of birits may ear their eggs.

TERRITORIALITY Often detend their territory against other woodpeckers.

OFFSPRING Woodpeckers lays 3-6 equs each year

COMPATIBLE WITH MAN



TASK G

Describe in writing three influences that you observed that have changed the habitats in this area and the cause and effect relationships that occurred.

Consider:

- a. Evidence of change, influence that cause it
- b. What the area may have looked like before the change occurred and the animals that lived there then
- c. What the area looks like now and what animals live there
- d. How the change affected the habitat and the animal species that did and do live there.

TASK H (individuals or small groups)

In addition to the factors we have collected information about today, list others that affect the wildlife and their habitat.

Factor	Who Is Involved	Influence on Animal
×		<u> </u>
Section 1		
"ne ig		

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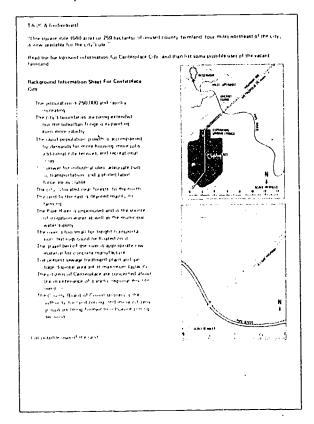
a lesson plan for

A LAND USE SIMULATION

Set the stage for this investigation by reviewing quickly what will take place. For example, "During this activity, we will participate in a simulation game concerning land use in a hypothetical community, analyze what we have done, and discuss some ideas and ways for you to develop your own simulation game about local environmental issues or concerns." The techniques combine elements of simulations, games, and role-playing. Participants assume the roles of decisionmakers in a simulated environment and compete for certain objectives according to specified procedures and rules.

Note to facilitator: Both the metric and English systems of measurement are included in the lesson plan. If it has not already been determined, you should discuss and decide with the group which system will be used.

- I. NAMING, RECORDING, AND CLASSIFYING POSSIBLE USE OF LAND
 - 1. Distribute Task A. Read the problem to the group and then have them read the given information on Task A and list possible uses of the land to meet the city's needs.
 - 2. "The problem is to identify some possible uses for the 1 square mile (640 acres, or 259 hectares) of county farmland, 4 miles northeast of the city."



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(US)



Questions and Discussion

When most people have started to write down uses on Task A, go ahead with question 1.

- 1. "What are some possible uses for the undeveloped land?" As people respond, write all comments just as they are said. Instead of paraphrasing if they are too wordy, ask: "How shall I write that on the chart?" List all suggestions, specific or general. Number the items as you go along, to simplify identification later. When you feel that you have enough material, go on to question 2.
- 2. "Which of these possible uses are similar?" Designate similar uses by letters, symbols, or colors. When most are designated, or the group seems to run out of thoughts, stop. Change items among categories if the participants change their minds. Do not get bogged down in the details of grouping. For example, if some people think one use should be in another category, then put that use in both categories and go on to the next step.
- 3. "What label could we give to all the items in the same category?" (Recreation, industrial, utilities, housing, commercial.)

II. DEVELOPING AND GIVING PRESENTATIONS

- 1. Divide the group into the number of land use categories identified, with not more than eight persons per section. Assign one of the categories to each group for them to represent. One way to set up groups is to have the total group count off by the number of categories identified.
- 2. Pass out Task B. Inform the participants, "You have 10 minutes to list and analyze the advantages and disadvantages of possible uses for the vacant land in the assigned category. You may consider those listed on the board plus any other possible uses you can think of in your category." It is important to stress that this task is to just analyze the uses of the land.

G100p	Assigned Category of Land Use	
	to analyze and list possible consequences of . Do not decide which is the best use.	different land uses within your assigned
Use	Advantages to land/people	T
	e i como e e e e e e e e e e e e e e e e e e	the state of the s
	•	·
		* * * * * * * * * * * * * * * * * * *



- 3. (After about 10 minutes) "Your next task is to develop a land use category." (About 20 minutes) After each group has started their planning (5-10 minutes), go to step 4. If all the directions are given at first, many groups start drawing a map before considering different land uses.
- 4. a. "We have just received word that hecause of the current workload from reading environmental impact statements, the members of the Board of County Commissioners have all resigned. Each group has one minute to elect one member to represent them on the Board."
 - b. One of the facilitators takes the new Board members to another room and:

Passes out Task C and reviews it with them
Tells them they have 15 minutes until the group meeting starts.
Has them concentrate on evaluation criteria first
Tells the Board to elect a chairperson to preside during the group presentation
Instructs the chairperson to read over the announcements at the bottorn of Task C to the whole group
Decides which staff person will be the timekeeper.

TASK C. (County Board members only)

"One square mile of unused country familiand, four imles northeast of the city, is now available for the city's use."

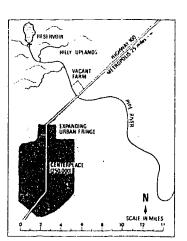
- 1. Using this information, your task is to
 - a. Develop criteria to evaluate the proposals.
 - b. Develop a system to record your evaluation of each proposal.

Background Information Sheet For Centerplace City

- The population is 250,000 and rapidly in creasing.
- The city's boundaries are being extended, but the suburban fringe is expanding even more rapidly.
- The rapid population growth is accompanied by demands for more housing, more jobs, additional city services, and recreational areas.
- The power for industrial uses, adequate public transportation, and a skilled labor force are available.
- The dity is located near forests, to the north. The faild to the east is devoted mainly to farming.

Group Making Presentation (use category)

- The Pipe River is unpolluted and is the source of irrigation water as well as the municipal water supply.
- The river is too small for freight transportation, but logs could be floated on it.
- The gravel hed of the river is appropriate raw material for concrete manufacture.
- The present sewage treatment plant and garbage disposal area are at maximum capacity.
- The critzens of Centerplace are concerned about the maintenance of a scenic regional environment.
- The County Board of Commissioners is the authority for land zoning, and many citizens' groups developing are being formed to influence zoning decisions.



!	Criteria to Evaluate Proposal (Rating)				
1	2	3	4	5	6
:	i		İ	- 4	
•	1		-		
:	:			-	
•		1		-	
f					
i.	. i.				

Flect a charperson to preside during the presentations to the group and to run the meeting in an orderly manner, (5 minutes) Announcements to be made by charperson.

- Because of time constraints, there will be no rebuttal after presentations.
- The Board may ask two or three clarifying questions of each group after all the presentations.
- You have 3 minutes to give your presentation. You will be given a waining when you have 1 minute left



c. After the Board leaves the room, make this announcement.

"You have about 15 minutes to finish your plan and develop a 3-minute presentation to be made to the County Board of Commissioners. Your 3-minute presentation must include a visual display, such as a land use map, as a part of your presentation, and more than one person in each group must participate in making the presentation." Pass out markers and large paper to each group.

- When all groups are ready, have the Board enter the room and sit at the front. The chairperson makes the announcements from Task C and sticks to them, in order to keep the process moving. The timekeeper is to stop all presentations at 3-minutes and give 1-minute warnings.
- 6. When the presentations are finished, the Board retires for 5 to 10 minutes to select the best proposal.
- 7. "While the Board is meeting, each group is to develop a list of criteria that they think should be used in evaluating the plans submitted." Pass out Task C to use in developing the criteria.
- 8. The County Board re-enters the room, reads their criteria aloud, announces their decision, and reads criteria used in making the decision. Board adjourns.

Person in charge must move rapidly to the next question to avoid shouting matches between losing groups. Have Board members return to the groups who selected them. The main purpose is to evaluate the process, not to get bogged down in the content of the issue.

Questions and Discussion

1. "What additional data would you have liked to have for planning your group's proposal?"

As examples, list on board: Topography, vegetation, economy of area, railroad, shopping center, adjacent land, climate, soil survey, historical information, flood plain, wildlife, interest of board of control, money available, educational needs, regulations by State, existing zoning, political climate, population information (age needs, race, jobs).

- 2. "Where would you go to collect information on these topics?"
- 3. Point out to the group that this is one of the most important parts of the activity because it emphasizes that we need a variety of information and data before we can intelligently make a land management or environmental decision to best meet the needs of people and their environment. This list has many of the elements that need to be considered in studying a local environmental issue or concern. It also includes elements of all the curriculum subject areas (social studies, science, language, arts, etc.). We have to use, therefore, the total community as a classroom or learning environment to collect the information.
- 4. Discuss any case histories of teachers or groups using this approach.

HI. ANALYZING CHARACTERISTICS OF SIMULATIONS

(Have on chart)—"One group of people working with simulation games has identified at least three basic characteristics of most simulation games:

- 1. "There is a clearly defined problem,
- 2. "There are factors that influence the decision,
- 3. "There are individuals and groups interested in the decision."

IV. DEVELOPING YOUR OWN SIMULATION GAME

 "The most exciting simulation games are ones people develop themselves, on the basis of local environmental issues in their community, State or region."



LS-4

- 2. "Can you think of some current environmental issues in your own community around which you could develop a game?" Call for responses.
- 3. "For the next 30 minutes, work with one or two other people to develop the format for a simulation game based on a local land use issue or topic of your choice. At the end of the time, we would like to hear from several of you about what you have developed." Have copies of current newspaper articles available if participants want to use them, Pass out Task D.

TASK D. (groups of 2 or 3)	
DEVELOPING A SIMULATION GAME	
Using a newspaper article about a local environmental land use problem, develop the format of a simulation game, considering the following items:	
Identification of the problem or issue to be decided upon	
Herst-heation of some factors having an influence on the decision	
•	
·	
•	
Identification of individual or group roles (those people or groups that will be affected by, or interested in, the problem).	
•	
•	
Other things you may want to consider in developing simulation games: Establishment of conditions for the players (noting procedures, available resources, money, etc.)	
Development of specific goals or objectives for players	
Inclusion of limits, or cules for what is permissable behavior (time factors, trade — noint system, money allocations, etc.)	



V. SUMMARY

- 1. Discuss Task D.
- 2. "How can you use the techniques in this session in your job situation? In the classroom?"
- 3. "How could a game like this develop decisionmaking skills in environmental management?"
- 4. "Flow can we take this process and use it to involve the public in social and political decisionmaking action projects in the community?"
- 5. "How can we summarize the use of simulation games in environmental interactions?"
- 6. "Simulation games can help people to understand problems in the environment and develop awareness and concern about these problems and the skills needed for citizen action and involvement in environmental management."
- 7. You may want the participants to evaluate the session by writing how they felt about it.

VI. SOME OBJECTIVES

Behavioral Outcomes in Knowledge

- 1. As a result of this session, each participant should be able to:
 - a. Identify and describe three component parts of simulation games
 - b. Construct his or her own simulation game based on a current environmental issue
 - c. Name and describe at least 10 important types of data needed before making a land management decision
 - d. Identify cause and effect relationships that exist in environmental management
 - e. Describe alternative solutions to solving a specific problem.

Behavioral Outcomes in Feelings, Awareness, Values, and Action

- 1. As a result of this session, each participant should be able to:
 - a. Describe how the information in Part III could affect their life, community, and the management of the environment
 - b. Outline a plan of action to develop their own tubu use simulation model.

VII. EQUIPMENT NEEDED

Blackboard and chalk or easel and markers
Newsprint or butcher paper (enough for each

Newsprint or butcher paper (enough for each group to make visual display)

Markers (four colors for each group to make visual display)

Masking tape

Task Cards

Commercial games on display (optional)

The Centerplace city problem has been adapted with permission from the May 1970 Journal of Geography from the article, "A Land Use Alternatives Model for Upper Elementary Environment Education," by Dennis Asmussen and Richard Cole, University of Washington.

The tasks and discussion topics in this lesson are designed so that many can be done individually or in combination, depending upon the facilitators' objectives and time constraints.

It is suggested by the writers that continual plan revision be done by the people who use this plan.



LS-6

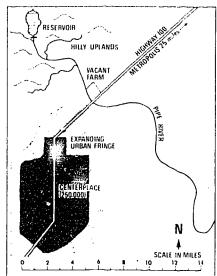
TASK A (individuals)

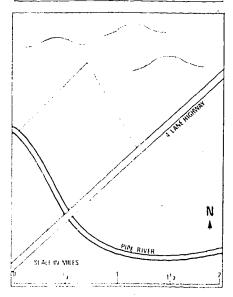
"One square mile (640 acres or 259 hectares) of unused county farmland, four miles northeast of the city, is now available for the city's use."

Read the -ackground information for Centerplace City, and then list some possible uses of the vacant farmland,

Background Information Sheet For Centerplace City?

- The population is 250,000 and rapidly increasing.
- The city's boundaries are being extended, but the suborban fringe is expanding even more rapidly.
- The rapid population growth is accompanied by demands for more housing, more jobs, additional city services, and recreational areas.
- The power for industrial uses, adequate public transportation, and a skilled labor force are available.
- The city is located near foresis, to the north. The land to the east is devoted moinly to farming.
- The Pipe River is unpolluted and is the source of irrigation water as well as the municipal water supply.
- The river is too small for freight transportation, but logs bould be floated on it.
- The gravefibed contaction is appropriate raw material for concrete manufacture.
- The present sewage treatment plant and garbage disposal area are at maximum capacity.
- The citizens of Centerplace are concerned about the maintenance of a scenic regional environment
- The County Board of Commissioners is the authority for land zoning, and many citizens droups are being formed to influence zoning decisions.
- List possible uses of the land.





LAND USE SIMULATION Task Card Forest Service 1976

Group Assigned Category of Land Use				
Your only task is to analyze and list possible consequences of different land uses within your assigned and use category. Do not decide which is the best use.				
Use	Advantages to land/people	Disadvantages to land/people		
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1	}	TO SECURE OF THE PROPERTY OF T		
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	•			

LS-8



TASK C. (County Board members only)

"One square mile of unused country farmland, four inites northeast of the city, is now available for the city's use."

- 1. Using this information, your task is to:
 - a. Develop criteria to evaluate the proposals,
 - b. Develop a system to record your evaluation of each proposal.

Background Information Sheet For Centerplace Crty

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The city's boundaries are being extended, our this suburban fringe is expanding even more rapidity.

The rapid population drowth is accompanied by demands for more housing, more jobs, additional city services, and recreational state.

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Group Making Presentation (use pategory)

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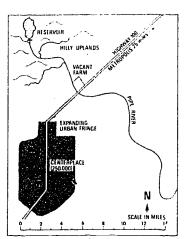
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Criteria to Evaluat (Rating)			to Evaluate (Rating)	Proposal		
	1	2	3	4	5	6
	1.					٠.

Elect a charperson to preside during the presentations to the group and to run the meeting in an orderly manner, (5 minutes) Announcements to be made by charperson.

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You have 3 minutes to give your presentation. You will be given a warning when you have 1 minute left.

LAND USE SIMULATION Task Card Forest Service 1976



DEVELOPING A SIMULATION GAME Using a newspaper article about a local environmental land use problem, develop the format of a simulation game, considering the following items: Identification of the problem or issue to be decided upon Ifentification of some factors having an influence on the decision Identification of individual or group roles (those people or groups that will be affected by, or interested in, the problem). Other things you may want to consider in developing simulation games: Establishment of conditions for the players (noting procedures, available resources, money, etc.) Development of specific goals or objectives for players Inclusion of limits, or rules for what is permissable behavior (time factors, trading, point system,

TASK D (groups of 2 or 3)



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money allocations, etc.).

a lesson plan for

INVESTIGATING A MAN-BUILT COMMUNITY

Set the stage for this session by reviewing what will take place. For example: "During this session we will identify parts of a man-built community. Look at the pattern of land use, construct a procedure and plan to investigate one part of the community, collect some data, analyze different solutions, and then develop an action plan to implement one of your solutions or recommendations."

Overview of the Process

The procedure outlined in this process falls into the following 10 basic steps or phases and could be used as a check-list for preparing almost any investigation.

I. BECOMING FAMILIAR WITH THE COMMUNITY

Identification of land use areas and patterns

II. IDENTIFYING AND FOCUSING ON LAND USE PATTERNS TO INVESTIGATE

Overall view of the community Construction of a three-stage data collecting chart

III. IDENTIFYING AND ANALYZING THE TOPIC FOR YOUR INVESTIGATION

Investigation with data that are observable, collectible, and recordable. Use of three-stage, data-collecting chart to analyze investigation. Construction of a data-collecting and recording device to use in investigation. Development of a procedure to test out the investigation process.

IV. CONDUCTING THE INVESTIGATION

Testing of the investigation process Modification of the procedures, data collecting tools, etc.

V. PREPARING AND REPORTING ON THE INVESTIG

Description of the process, procedures, and modifications made in the investigation process (this step is not giving solutions to the subject or content investigated)

VI ANALYZING FACTORS AND ALTERNATIVES TO THEIR PRESENT CONDITIONS

Listing of factors that contribute to problems

Brainstorming of changes (elimination, modification, substitution) affecting the problem

VII. DEVELOPING ACTION PLANNING TO BRING ABOUT AN IMPROVEMENT OR SOLUTION TO THE ENVIRONMENT INVESTIGATED

Determining if solution is feasible

Development of plan of action for implementing solution or recommendations

VIII. COMMUNICATING FEELINGS, AWARENESS, AND VALUES

IX. IDENTIFYING A COMMUNITY BY USE THEMES

X. SUMMARIZING THE INVESTIGATION

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Investigating Your Environment Series Forest Service 1976 MBC-1

BECOMING FAMILIAR WITH THE COMMUNITY

Questions and Discussion

Peak traffic needs Attitude of people

- 1. "What are some major land use categories found in most communities?" List on board commercial, residential, recreation, industrial, etc.
- 2. Pass out map of local community being studied. Have each group locate the major land use categories on the map with marking pens.

IDENTIFYING AND FOCUSING ON LAND USE PATTERNS AND INTERRELATIONSHIPS 11.

- 1. "After looking at your map and locating the land uses on it, what can you say about the pattern of land use in your community?" List on board.
- 2. "We want to find out more about the different land use categories in this area."
- 3. "One tool that can help us is to construct a three-stage, data-collecting chart."
- 4. "As an example, let's do one together." Pick a subject other than a land use category listed on the board to illustrate the use of the chart.
 - a. "Let's pick Transportation as the topic to be investigated." Write transportation at the top of chart.
 - b. "The first column is labeled What we want to find out about the topic." Write this at far left on board and ask for group responses.
 - c. "The second column is labeled How to collect information about the item listed in column 1." Write this heading next to column 1 and ask for group responses. Ask for ways to collect information on the first four to five items in column 1, one at a time, then ask, "Are there any additional ways you can think of to collect the information in column 1?"
 - d. "The third column is labeled How to record the information we are going to collect." Write this heading next to column 2 and ask for group responses. Just ask for general ways to record the information for any items.

Here is what a chart might look like after doing it with the total group.

Three-Stage, Data-Collecting Chart Subject: Transportation

Column 1 Column 2 Column 3 What we want to find out How to collect How to record Location of major arterials Observation Graphs Kinds of transportation Interview people What is needed Existing studies How much is available Count number of cases Film Accessibility of terminals at certain place Land topography Count types of vehicles Is it working Map What is being used now **Tables** Growth pattern Traffic flow pattern

Statistics Pictures Tape recorders

Questionnaire



Questions and Discussion

1. "What might be the benefits of analyzing a land use or topic this way before going out to do an investigation about it?" (Sample responses might include, it's easier to see all the parts of the topic; analyzing it breaks it down into manageable parts to study; you realize that problems aren't as simple as they seem.)

Here are two additional options to consider instead of investigating land use categories in step 2, depending on the objectives of your plan.

- Chan 1. If your objective is to investigate environmental factors, then use this question after step 2: "What are some factors that might affect the quality of the environment of the area on this map and in what ways will they affect the environment?" (List on chart.)
- Option 2: If your objective is to investigate a potential or existing problem, then ask this question after step 2: "What are some problems that might be created by the pattern of the land use in your community?"

III. IDENTIFYING AND ANALYZING THE TOPIC FOR YOUR INVESTIGATION

The following are criteria to be used by the facilitator in identifying an area to investigate:

- -Within walking distance in the time segment allotted (3 hours of field investigation)
- -A variety of land use categories
- -Examples of changing land use
- -Interesting to study.
- 1. Describe the area that the group is doing to investigate and have each person draw that area on his or her map.
- 2. Split class into appriate number of study teams, (groups of 4-5) and have them pick a land use category, (Make sure all land uses have been taken.)
- 3. Have study teams identify the land use category they are going to investigate in the designated area and fill out column 1 of the three-stage chart in Task A. (15-20 minutes)

THREE STAGE DATA COLLECTING AND ANALYZING CHART			
Work ham your go an fill out the land	use category and column 1 of t	he chart below.	
Land Use Category			
Column 1	Calumn 2	Column 3	
What we want to find out	How to collect the	How to record the	
about our land use dategory	information ;	information,	
in the area			
•	-		
	•		
		•	
		•	





- 4. "Identify one or two items from column 1 of your chart that you want to find out more about from actual observations in the area to be investigated, and construct a data-collecting and recording device to use in collecting and recording your Observations. The items you select must deal with data that are observable, collectible, and recordable in your area during the actual field investigation and within the time constraints. Filling out columns 2 and 3 may help in your planning."
- 5. Have sample data-collecting and recording charts to hang up as sample displays.

Age Group Swim Walk Bike Other O-6 yrs	(4:00-4:15 p.m.) No of Cars	X I X
7-12		X
	50	
	50	
13/21	50	
21.30	40	X
30-40	30	
10+	20	
	10	
	0	Legend: X fire hydrant
	1 2 3 4 5 6	X fire hydrant I telephone pole
1	No of Occupants	- restrooms

- 6. When the groups have almost finished making the data-collecting charts, tell them to develop a plan of action to investigate their part of the environment using the data-collecting and recording devices in the allotted field time. (Consider dividing responsibilities for collecting and recording information, who goes where, other tools needed, etc.) Data must be observable, collectible, and recordable.
- 7. After 10 minutes into the planning, put up and read the following sign:

Planning for an Investigation

Usually, the problems that people have are deciding what to do and narrowing down the scope of the topic to something specific enough to actually investigate. Has your group experienced this?

- 8. Before going out to do the investigation, have each group make a short presentation to describe the procedures and to display the recording devices to be used in the investigation. If you have a large class, have groups pair up and critique each other's plans instead of each small group presenting it to the total group.
- 9. Just before dismissing the groups to do the field investigation, put up the following sign:

This Session is all About Learning How to Prepare for an Investigation

Today the procedures are more important than the content. The idea is to try out your data-collecting and recording methods.

It may be necessary to modify your investigation procedures as you become involved in your task.

IV. CONDUCTING THE INVESTIGATION

Tell group: "You now have ___ hours to do your field work. Be back here at <u>(time)</u>. You will then have 1 nour to prepare a 5-10 minute report about your investigation. Instructions for the report will be posted when you return."

V. PREPARING AND REPORTING ON THE INVESTIGATION

Have following instructions posted as groups come back so they have some guidelines for their presentation.

Instructions for the Presentation

- 1. Describe your task.
- 2. Report on what you did, how you did it, and what it meant.
- 3. Describe how you modified your procedure, methods, recording devices, etc.
- 4. Use more than one person as spokesman.
- 5. Use visual displays.
- 6. Limit report to 5-10 minutes.
- 7. This is a report about the investigation process and not the content or solutions to problems, unless it relates to the process.
- 8. Do not report on all the minute details.

Each group should give its presentation. Stick to time limits and to the process of the investigation.

- 1. "What problems did you encounter in your investigation?"
- 2. "What is the next thing to do with all this information?"

VI. ANALYZING FACTORS AND ALTERNATIVES TO THEIR PRESENT CONDITIONS

Questions and Discussion

- 1. "What are the basic functions of your study area?"
- 2. "What are some of the needs of the area?"
- 3. "What impact does your survey area have on the management on your community?"
- 4. "What examples are there in your area that:

Illustrate the past.

Typify the present.

Indicate the future.

- 5. "What interrelationships can we identify in the area investigated, on the basis of your field observations (residential to business, past use to present use, business district to transportation routes, etc.)
- 6. "How do these things above affect the function of the community?"
- 7. "Select one issue, concern, or problem that you identified in your investigation. Using Task B, list and analyze as many factors you can identify." (30 minutes)
- 8. Have example shown on Task B on flip chart to show how chart should be used.



FASK B

ANALYZING FACTORS AND ALTERNATIVES TO PRESENT CONDITIONS

Task B is designed to brainstorm all possible alternatives. List the factors contributing to the issue. Take each factor and ask, "how can this factor be changed eliminated, modified, substituted to bring about a change in the issue? Consider all alternatives, no matter how silly they may seem.

How It Contributes To The Problem or Issue

Alternatives To Its Present Condition Select one or more alternatives below and describe how the factor might be

Describe How The Change Will Affect The Problem

Or Issue

Elimination Modification Substitution

Example.

Traffic Management

Width of streets

Causes traffic jams

Put in walking or bicycle paths

changed.

Eliminate car traffic, cause changes in working and social

One-way streets

Ease congestion because of one-way flow

Mass Transit

Minimize number of vehicles, no congestion, less air pollution, etc.

Spread out traffic over a longer period of time

Everyone quits work ut same time Causes traffic jams

Adjust starting, closing, working hours

Describe the afternative or combination of afternatives that might bring about an an improvement solution to the quality of the environment investigated. Give reasons for your choices,

After you have analyzed the factors in Task B, go on to Task C

VII. DEVELOPING AN ACTION PLAN TO BRING ABOUT AN IMPROVEMENT OR SOLUTION TO AN ISSUE OR CONCERN JUST INVESTIGATED

Select one of the alternatives from Task B. Write it in Task C under Suggested Solution and complete the task. This can help you to determine if your solution is feasible or not and what course of action you should take for its implementation.



DEVELOPING	ACTION PLANNING TO BRING A	ABOUT AN IMPROVEMENT	OR SOLUTION TO THE EN	VIRONMENT INVESTIGATE
Selectione of th	e solutions suggested by your group	in Task B. Write it below und	er Suggested Solution. Comp	lete the rest of the chart.
Action Planning For Problem-Solving			blem-Solving	
Suggested Solution	Type Action Necessary To Implement The Solution	Identify Change Agents Who Could Help Implement The Solution	Implementation Steps To Problem Solution	Evaluation Methods, How Will you Follow Up And Evaluate The Effectiveness Of Your Action?
a natigado y 100 departmenta de				4-4
	and the state of t		No. of the state o	,
	MARK THE C T WINDS THE THE THE THE THE THE THE THE THE THE	111 111 11 11 11 11 11 11 11 11 11 11 1	and a contraction of the contrac	The second secon
	Technological What kinds of tech- nological action would	Individual What kinds of things could be	What must be done? In what order? When?	
	be necessary to implement this idea?	done through individual action?	Steps Target Date 1. 2. 3.	
	Social What kinds of social action would be necessary to implement this idea?	Groups What kinds of things could be done by or through groups? Informal Formal (organization		·
	Political What kinds of political action would be necessary to implement this idea?	Agencies What kinds of things could be done by or through agencies?		

Questions and Discussion

- 1. Have group give reports on Task C.
- 2. "What are your recommendations for meeting future needs in this area?"
- 3. "If you were on the city planning commission, what guidelines would you develop for consideration for future developments in this area?"

VIII. COMMUNICATING FEELINGS, AWARENESS, AND VALUES

Write the following task on the board:

TASK D

Describe your part in implementing the action plan in Task C:

As a member of a community action group.

As a part of the political decisionmaking process in your community.



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Questions and Discussion

- 1. Discuss individual comments.
- 2. "What type of community action can we take to identify and motivate people to collect, interpret data, arrive at alternative solutions, and take intelligent action to decide on the best solution consistent with the needs of the environment and society?"

IX. IDENTIFYING A COMMUNITY BY USE OF THEMES

We have just investigated a community environment using a topical approach of land use categories.

Another way to identify and investigate a district or community is by looking at themes. Themes can be one way to identify and define an area to investigate.

Have each person describe in writing the four items below for their own community or neighborhood.

- 1. "Describe where your neighborhood is."
- 2. "How do you get into your neighborhood?"
- 3. "What are some outstanding features of your neighborhood?"
- 4. "What is the central part of your neighborhood?"

Questions and Discussion

1. (Have these themes and their definitions on a chart.) One set of themes includes:

Pathways — Lines of movement (walks, bus routes, streets)

Nodes - Small areas of intensive focus where an observer may enter and feel a sense of belonging,

safe, enclosed (small park, courtyard, intersection, intimate shopping center)

Edges - Linear breaks in continuity (freeway, river, edge of hills)

Landmarks - Identifiable objects or reference points (high-rise building, fountain).

- 2. Now have each person identify which description of their community was a pathway, node, landmark, or edge.
- 3. If possible, have a short slide presentation (10-15 slides) on examples of the themes from different scales and perspective.
- 4. "What are some themes in the area we studied yesterday?"
- 5. "We want to study an area using the thematic approach, and the categories of pathways, nodes, edges, and landmarks." Assign an area to each group; it could be the same area or new areas. Pass out Task E.



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TASK E (small groups)

Identify and analyze the themes in your assigned area. Describe them in writing or sketch or photograph the themes in the area. Analyze the area's problem and potential in the chart below.

Pathways

Lines of movement (walks, bus routes, streets)

Nodes:

Small areas of intensive focus where an observer may enter and feel a sense of belonging,

safe, enclosed, (small park, courtyard, intersection, intimate shopping center)

Edges. Landmarks: Linear breaks in continuity (freeway, river, edge of hills)

Identifiable objects or reference points (high-rise building, fountain)

Use the following chart

ITEM	THEME IT	PROBLEMS TO COMMUNITY	POTENTIAL TO COMMUNITY
	•	•	
		I.	
		•	
		4	
		;	
		•	
			1
•			
			1

- 6. Have groups share results.
- 7. (Have on chart.) The following are some reasons for identifying themes.
 - a. If community has only one theme, it is often a boring environment.
 - b. If themes are varied and strong, then a strong exciting community environment can exist.
 - c. If an area is dying out, nodes, points of interest, pathways, etc., might be created to strengthen the themes in ways that contribute to the livability of the community.
 - d. You can identify a community or neighborhood by themes.
- 8. "Let's make a comparison of the two methods (thematic-topical) of looking at an area. Select four to six items in an area studied and describe them in thematic and topic terms.

Item	Theme	Topic "
Park	Node	Recreation
Major street	Pathway	Transportation



X. SUMMARIZING THE INVESTIGATION

- 1. "What procedures did we use in our investigation today?"
- 2. "What did we find out about the environment in our study?"
- 3. "How will this process help you when you have students or community groups investigate things?"
- 4. "How can we summarize our discussion and investigation?"
- 5. You may want participants to evaluate the session by writing how they felt about this session.

XI, SOME OBJECTIVES

Behavioral Outcomes In Knowledge

- 1. As a result of these activities, each participant should be able to:
 - a. Identify at least five different land use categories in an urban environment
 - b. Name and describe three themes often found in committees
 - c. Construct a data collecting and recording tool for some part of an urban environment for data that is observable, collectable, and recordable
 - d. Describe a procedure to use in initiating an urban environmental investigation
 - e. Identify at least three component parts of an urban environment
 - f. Describe four interrelationships that exist among component parts of the environment.

Behavioral Outcomes in Feelings, Awareness, Values, and Action

- 2. As a result of these activities, each participant should be able to:
 - a. Analyze factors and alternative solutions to present condition in an environment
 - b. Identify forces and change agents that can be used for or against the improved livability of the area
 - c. Describe what he or she can do to become involved in community action programs of identifying and suggesting solutions to local environmental problems
 - d. Describe how he or she and the community can become involved in affecting the local political decision-making process through environmental urban investigations
 - e. Describe three ways that themes can improve the livability of a community.

XII. EQUIPMENT NEEDED

Maps of the urban area to be investigated Blackboard or newsprint and easel. Felt-tip markers or chalk Paper and pencils

The tasks and discussion topics in this lesson are designed so that many can be done individually or in groups, depending upon the facilitators' objectives and time constraints.



The information and procedures under the following five topics — Land Use Survey; Environmental Assets and Liabilities Survey, Community Facilities and Services Survey; Social Survey; and Micro-Urban Investigations — are included to give additional ideas and considerations in developing the different components of a community survey.

LAND USE SURVEY

1. Inventory and plot on map

List the major uses of land in the area.

Group these uses into appropriate categories.

Label the categories.

Develop a legend for plotting these data on the map.

2. Additional Information

DEVISE YOUR OWN METHODS TO COLLECT AND RECORD THESE DATA.
SUBMIT THE METHODS AND THE DATA, IN WRITING, TO YOUR GROUP LEADER AT THE END OF THE SESSION.

How does each land use affect the other land uses of the area?

What problems exist because of certain land uses?

What land use problems in this area are related to regional environmental problems?

What things are being done to the land that are compatible with the:

Characteristics of the land? Needs of the people?

Which land uses are changing?

What proposed projects could affect land use patterns in this area?

NOTE:

The above questions are designed to help you look for significant relationships among things in the environment. Time may not allow you to investigate all of the suggestions. Therefore, you will have to decide which things are most significant in the time allowed. Please feel free to add to the list, throw it away and start all over, etc.

Something to think about

For each of the land uses you investigate, ask yourself: Is it in a good location to serve its purpose? What does it do to the environment? What kind of an environment does it have?

ENVIRONMENTAL ASSETS AND LIABILITIES SURVEY

1. Inventory and plot on map

List the environmental assets of the area (physical and visual).

Examples:

Hi.toric landmarks, visual impact structures, natural features, and aesthetically pleasing entrances.

List the environmental liabilities of the area (physical and visual).

Examples:

Conflicting land uses, high traffic streets, residential overcrowding, poor paving, curbs, sidewalks, edverse natural features, and sameness of environment.

Group the environmental assets and liabilities into appropriate categories.

Label the categories.

Develop a legend for plotting these data on the map.

2. Additional information

DEVISE YOUR DWN METHODS TO COLLECT AND RECORD THESE DATA.
SUBMIT THE METHODS AND THE DATA, IN WRITING, TO YOUR GROUP LEADER AT THE END OF THE SESSION.

How do the environmental assets affect the rest of the area? Be specific.

How do the environmental liabilities affect the rest of the area? Be specific.

Which environmental assets have potential for serving as building blocks to improving the livability of this area?

What problems exist because of adverse environmental factors in the area?

What environmental problems in this area are related to regional environmental problems?

What proposed projects could affect environmental assets and liabilities in this area?

NOTE: The above questions are designed to help you look for significant relationships among things in the environment. Time may not allow you to investigate all of the suggestions. Therefore, you will have to decide which things are most significant in the time allowed. Please feel free to add to the list, throw it away and start all over, etc.

Something to think about

For each of the environmental assets and liabilities you investigate, ask yourself:

Is it in a good location to serve its purpose? What does it do to the environment? What kind of an environment does it have?

3. Summary questions on environmental assets and liabilities

See questions and discussion after Task D.



COMMUNITY FACILITIES AND SERVICES SURVEY

1. Inventory and plot on map

List the community facilities and services in this area. Group these facilities and services into appropriate categories. Label the categories.

Develop a legend for plotting these data on the map.

2. Additional information

DEVISE YOUR OWN METHODS TO COLLECT AND RECORD THESE DATA.
SUBMIT THE METHODS AND THE DATA, IN WRITING, TO YOUR GROUP LEAGER AT THE END OF THE SESSION.

List the user groups for each category in step 1.

What reasons can you give for the locations of each of the community facilities and services you listed in step 1?

What needs of the people are being met by these facilities and services?

What needs are *not* being met by existing facilities and services?

What problems are associated with the quantity and quality of community facilities and services in this area?

Which of these problems are related to regional environmental problems?

What proposed projects could affect the use and effectiveness of community facilities and services in this area?

NOTE:

The above questions are designed to help you look for significant relationships among things in the environment. Time may not allow you to investigate all of the suggestions. Therefore, you will have to decide which things are most significant in the time allo ved. Please feel free to add to the list, throw it away and start all over, etc.

Something to think about

For each of the community facilities and services you investigate, ask yourself:

Is it in a good location to serve its purpose? What does it do to the environment? What kind of an environment does it have?

SOCIAL SURVEY

1. Inventory and plot on map

Collect information about the population characteristics of the area.

Age, income, education, size of families, renters-owners, length of residence, etc.

Develop a legend for plotting these data on the map.

2. Additional information

DEVISE YOUR OWN METHODS TO COLLECT AND RECORD THESE DATA.
SUBMIT THE METHODS AND THE DATA, IN WRITING, TO YOUR GROUP LEADER AT THE ENO OF THE SESSION.

What needs of the residents are met by living in this area?

What social problems exist in the area?

Which problems associated with this area are related to regional environmental problems?

What changing conditions in the area are creating problems for its residents?

What proposed projects could:

Affect the life-style of people in this area?

Lead to a change in the population characteristics of this area?

What are the attitudes of the people in this area toward:

Governmental and private services

Citizen needs

Overall quality of life in the area.

NOTE: The above questions are designed to help you look for significant relationships among things in the environment. Time may not allow you to investigate all of the suggestions. Therefore, you will have to decide which things are most significant in the time allowed. Please feel free to add to the list, throw it away and start all over, etc.



MICRO-URBAN INVESTIGATIONS

In addition to major component parts or categories of an urban environment, there are many opportunities for small individual environmental investigations.

Investigations of this nature should be developed in writing along the same procedures as in this Lesson Plan.

TASK

Develop in writing an investigation about some part of the man built environment.

- a. Describe procedures in action or process terms.
- State objectives in behavioral outcomes that indicate some minimal expectations in acquiring new knowledge and skills.

Here are some suggested micro-urban environmental investigations.

- Correlation of observable weather conditions to air pollution index
- 2. Correlation of man-made sounds to noise pollution
- 3. Effect of signs and billboards on sight pollution
- 4. Effect of architecture on aesthetics
- 5. Impact of local shopping center on community
- 6. Supermarket survey (packaging, buying habits)
- Interpretation of man-built landscape using architectural styles, etc.
- 8. Onservation and recording of life in a park
- Under what conditions plant life can live in a blacktop environment
- Determining the different responses of water-holding capacity and runoff to different types of man-made surfaces
- 11. Environment of a city tree
- 12. Determining what is in a city block
- Noise pollution (determining who noises occur most frequently and which city noises can be reduced to minimize noise pollution)
- 14. Inventory and classification of historic structures within the central business district of your hometown and determining necessities for their protection
- Identification of factors and development of tools to help in recording and interpreting air pollution indexes in the local community.





TASK A (small groups)

THREE-STAGE DATA COLLECTING AND ANALYZING CHART

Working in your group, fill out the land use category and column 1 of the chart below.

Land Use Category

Column 1 What we want to find out about our land use category in the area	Column 2 How to collect the information	Column 3 How to record the information
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TASK B

ANALYZING FACTORS AND ALTERNATIVES TO PRESENT CONDITIONS

Task B is designed to brainstorm all possible alternatives. List the factors contributing to the issue. Take each factor and ask, "how can this factor be changed, eliminated modified, or substituted to bring about a change in the issue? Consider all alternatives, no matter how silly they may seem.

Factor

How it Contributes To The Problem or Issue Alternatives To Its Present Condition Select one or more alternatives below and describe how the factor might be changed. Elimination Modification Substitution Describe How The Change Will Affect The Problem Or Issue

Describe the alternative or combination of alternatives that might bring about an improvement or solution to the quality of the environment investigated. Give reasons for your choices

After you have analyzed the factors in Task B, go in to Task C

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TASK C						
DEVELOPING	ACTION PLANNING TO BRING A	ABOUT AN IMPROVEMENT	OR SOLUTION TO THE EN	VIRONMENT INVESTIGATED		
Select one of the solutions suggested by your group in Task B. Write it below under Suggested Solution. Complete the rest of the ci						
		Action Planning For Problem-Solving				
Suggested Solution	Type Action Necessary To Implement The Solution	Identify Change Agents Who Could Help Implement The Solution	Implementation Steps To Problem Solution	Evaluation Methods. How Will you Follow Up And Evaluate The Effectiveness Of Your Action?		
		endent communication of the	The state of the companies of the contract of	•		
	** ·					
	Technological What kinds of tech- nological action would be necessary to imple- ment this idea?	Individual What kinds of things could be done through individual action?	What must be done? In what order? When? Steps Target Date 1. 2. 3.			
	Social What kinds of social action would be necessary to implement this idea?	Groups What kinds of things could be done by or through groups? Informal Formal (organization	ns)			
	Political What kinds of political action would be necessary to implement this idea?	Agencies What kinds of things could be done by or through agencies?				

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TASK E (small groups)

Identify and analyze the themes in your assigned area. Describe them in writing or sketch or photograph the themes in the area. Analyze the area's problem and potential in the chart below.

Pathways:

Lines of movement (walks, bus routes, streets)

Nodes:

Small areas of intensive focus where an observer may safe, enclosed, (small park, courtyard, intersection

ise of belonging,

:enter)

Eages:

Linear breaks in continuity (freeway, river, edg

Landmarks:

Identifiable objects or reference points (high-rise busing a termitain)

Use the following chart:

ITEM	THEME IT	PROBLEMS TO COMMUNITY	POTENTIAL TO COMMUNITY
		The other was the large of the	
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